

Assumption-Based Planning for Army 21

James A. Dewar, Morlie H. Levin

DISTRIBUTION STATEMENT A
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20041208 173

The research described in this report was sponsored by the United States Army, Contract No. MDA903-91-C-0006.

ISBN: 0-8330-1268-1

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R-4172-A

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Prepared for the
United States Army

RAND

PREFACE

This report presents results of one phase of a project called *Future Combat Development Concepts*. The project supports the Training and Doctrine Command's (TRADOC's) work toward understanding future combat development and doctrine issues. This particular report is intended to help TRADOC develop Army 21, a vision of the Army and an operational concept appropriate for 25 to 30 years in the future. The Army 21 effort entails the development of a set of plausible alternative worlds that could eventuate within that span of time.

The results of this study are most relevant to those interested in future Army concepts and doctrine. Since Army 21 is an integral part of the Army Long-Range Planning System, the report will of course interest Army long-range planners. However, the methodologies used in this study are more general and should also be of interest to other long-range planners looking for an alternative to trend-based approaches to futures planning.

The research reported here was conducted at RAND's Arroyo Center under the auspices of the TRADOC Research Activity, a TRADOC-sponsored RAND entity that conducts studies of interest to the Commander of TRADOC and the force development community throughout the Army.

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The Arroyo Center is housed in RAND's Army Research Division. RAND is a private, nonprofit institution that conducts analytic research on a wide range of public policy matters affecting the nation's security and welfare.

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1. INTRODUCTION

THE ARMY'S APPROACH TO FUTURES PLANNING

In 1987, Army Chief of Staff GEN Carl Vuono directed (in a Memorandum of Understanding) the development of "Architecture for the Future Army" to provide the Army with a plan for the future, a strategy for the management of change, and a disciplined evolution of the Army's ability to fight with modernized forces and equipment. In part, the "Architecture for the Future Army" was a response to a perceived limitation of the Army's Concept-Based Requirements System (CBRS): It lacks evolutionary concepts. There was a concern that the AirLand Battle Concept had not evolved since its publication as doctrine in 1982 and that, as General Vuono noted, "without concepts that project warfighting trends into the future and evolve the AirLand Battle doctrine, we cannot provide the fundamental top-down, how-to-fight vision that is needed to guide and integrate all Training and Doctrine Command (TRADOC) planning efforts."

The Architecture for the Future Army, then, was an extension of the CBRS process that was to develop advanced warfighting concepts and a process of smooth evolution from one concept to the next. The advanced concepts were broken into three time phases:

- The AirLand Battle-Future (ALB-F) was to provide a "conceptual vision" of how the Army will fight with modernized forces in 15 years.
- Army 21 was to envision how the Army will fight between 15 and 30 years in the future.
- Advanced Concepts was directed toward alternative visions of how the Army might possibly fight in 30 years or more into the future.

RAND'S CONTRIBUTION TO THE ARMY'S LONG-RANGE PLANNING

ALB-F and Army 21 began development concurrently. The then-Deputy Chief of Staff for Doctrine (DCSDOC) TRADOC was tasked to develop the Army 21 vision of the world, and General Vuono asked RAND to support DCSDOC TRADOC by assessing the impact of trend projection data on future Army operations. To develop its glimpse of the world 30 years out, TRADOC conducted a Delphi ex-

periment aimed at achieving a consensus of Army-wide experts on trends in geopolitics, demographics, threats, strategies, and technologies. (The Delphi process, which was originally developed at RAND, is explained in Section 4.) Once the experts had identified the consensus trends, they fashioned a *single* vision of the future that was to provide a basis for far-term projections of future warfighting requirements. RAND supported that effort by independently assessing the TRADOC trends and world projection and investigating the potential for alternative futures that could lead to alternative visions of the future for the Army.

In our assessment of the TRADOC trends and world projection, we argued that the trends would support at least two plausible worlds with importantly different impacts on the Army and its doctrine. As a result, we recommended that the focus of Army 21 be changed from generating a single vision of the world as it might be in 30 years (and a corresponding umbrella concept) toward generating a range of worlds that encompass the most significant potential changes to Army doctrine in 30 years.

To investigate the potential for alternative futures, we developed the framework of a long-range planning methodology that included a method of developing a range of plausible alternative futures. Using that methodology, we generated four such futures as exemplars. Before either the RAND work or the TRADOC umbrella concept were formally documented, Army 21 work was suspended until work was completed on ALB-F.

Work on Army 21 was revived in 1990, and its focus changed somewhat in the intervening three years—a time that also saw dramatic changes in the world security environment. The ALB-F work produced an umbrella concept (now known as AirLand Operations [ALO]) that will form the foundation for an update of operational doctrine. Army 21 work retained much of its original intent to provide the Army with a vision of what it might face 25¹ years in the future. One significant change in the Army 21 concept was the shift from a single vision of the world in the future to a multiplicity of plausible worlds and the unique problems that each might present. The current Deputy Chief of Staff (DCS) for Concepts, Doctrine, and

¹One of the changes in Army 21 was from a focus 30 years to one 25 years in the future. For our own purposes of comparison with the 1987 work, we maintained a specific horizon at 30 years. Otherwise, unless specifically referring to the Army 21 process, we will use a more general 25-to-30-year time frame. In general, as long as the focus is 25 years or longer, the research is relatively insensitive to the exact time frame.

Development asked several institutions and agencies for their analytic assistance in identifying the challenges the Army might face in 25 to 30 years; among these were the Library of Congress; the Army's Intelligence and Threat Assessment Center; Military Professionals Research, Incorporated; and RAND.

OBJECTIVES

The RAND research project had two major objectives:

- Develop a long-range methodology for Army 21, and
- Generate a set of alternative future worlds that would stress the ALB-F Umbrella Concept.

The second of these was the original objective, and the first actually arose as an objective during the course of the research. Upon viewing the long-range planning methodology that we were using to generate alternative future worlds, TRADOC asked RAND to help them develop the methodology into an overall planning process for Army 21. We readily agreed and took the opportunity to develop it further as a generalized long-range planning methodology.

TRADOC was to further flesh out each of the alternative futures RAND developed, identify signposts that would indicate which one might be eventuating, and develop appropriate hedging and shaping actions in response to each.

These two objectives, of course, are intimately related. The long-range planning methodology is built around the process we use to generate the alternative scenarios that particularly stress the ALB-F Umbrella Concept, and generation of those scenarios is a necessary, though not sufficient, step in the Army 21 planning process.

Put briefly, this research developed a long-range planning methodology for Army 21 and demonstrated a partial implementation of that methodology by generating a set of alternative futures. The DCS for Concepts, Doctrine, and Development at TRADOC is responsible for Army 21 and will complete the application of the methodology that we developed.

ORGANIZATION OF THIS DOCUMENT

Section 2 of this report describes the methodology we developed for Army 21 specifically and for long-range planning in general. It includes a description of the methodology and a comparison of that

methodology with a more common approach to long-range planning that concentrates on trend extrapolation. Section 3 describes the implementation of the first step of our methodology—identification and analysis of the assumptions underlying ALB-F. Section 4 describes the identification, by means of an innovative Delphi exercise, of plausible changes in the world in 25 to 30 years that would affect the Army and its operational concept. These steps are critical in the generation of alternative future scenarios that stress the ALB-F Umbrella Concept. Section 4 also explains how the assumptions and plausible changes are combined in order to generate the alternative future scenarios and describes the scenarios thus generated. Section 5 offers conclusions and observations.

Appendices A and B describe ways in which we tested the validity of certain features of the methodology. Appendix C presents the actual responses of the participants in the last round of the Delphi exercise used to identify elements of change.

SUMMARY

MOTIVATION FOR THE STUDY

In 1987, Army Chief of Staff GEN Carl Vuono directed the development of an "Architecture for the Future Army." This architecture would provide strategies for managing change and allow a disciplined evolution of the Army's ability to use increasingly advanced forces and equipment, by providing advanced warfighting concepts. Three time frames are relevant for this planning, and an effort was assigned to address each: AirLand Battle-Future (ALB-F) addresses the first 15 years; Army 21 covers the 15-to-30-year period; and Advanced Concepts covers the period beyond 30 years. General Vuono tasked then-Deputy Chief of Staff for Doctrine (DCSDOC) TRADOC to develop the Army 21 vision of the world and asked RAND to support Army 21 by assessing the impact of trend-projection data on future Army operations.

In that early work, RAND argued for the consideration of alternative futures and developed a methodology for generating them. However, before either the RAND work or the vision TRADOC developed were formally documented, Army 21 work was suspended awaiting completion of the ALB-F activity. Work on Army 21 has been revived and revised with an emphasis on alternative futures, and the ALB-F work has produced an umbrella concept, which will serve as the basis for the updated operational doctrine. The current Deputy Chief of Staff (DCS) for Concepts, Doctrine, and Development asked RAND to assist his office in generating alternative future scenarios for use in subsequent stages of the Army 21 process.

AN INNOVATIVE APPROACH TO LONG-RANGE PLANNING

The most common approach to generating future scenarios is trend based—i.e., a future is projected by extrapolating current trends. This approach has limited value in long-range planning, because a long period of time increases the likelihood that one or another key feature of the world will change radically. Simple extrapolation will miss such changes. The methodology RAND developed in 1987, and that we have applied and extended in our study, is assumption based rather than trend based. Rather than trying to predict the future, it tries to deal explicitly with uncertainties. It rests on the following premise:

The Army operational concept will change (or require change) if its underlying assumptions about the world change.

Specifically, this assumption-based methodology proceeds by identifying the assumptions underlying the ALB-F Umbrella Concept, identifying (through expert opinion) possible "elements of change" 25 to 30 years from now that could bear on the Army's operational concept, looking for specific elements of change that would violate specific assumptions, generating future scenarios based on those assumption-violating elements, developing hedging and shaping actions to deal with the alternative future scenarios, and developing signposts that would indicate which scenario might be eventuating. (In the research we report here, we were asked to apply the methodology only through the stage of scenario generation, leaving the subsequent stages for the DCS for Concepts, Doctrine, and Development to complete.)

ASSUMPTIONS UNDERLYING THE ALB-F UMBRELLA CONCEPT

The assumptions underlying the ALB-F Umbrella Concept were identified through a process that included reading the documentation of the concept available as of November 1990 and talking with the concept's developers at the Combined Arms Center at Fort Leavenworth. The documentation explicitly stated 11 assumptions, and we inferred another eight implicit assumptions from the reading and discussions.

VIOLATED ASSUMPTIONS AND ALTERNATIVE FUTURES

Elements of change are loosely defined as trends or events that result in significant changes in the world. We identified these through a Delphi process that asked respondents to imagine they had slept for 30 years and then asked them to guess what the Army's operational concept was. Before answering, they were allowed to ask ten yes-or-no questions about the state of the world. The resulting questions formed the basis for our list of the elements of change in that these questions were specific about the state of the world, were plausible enough to be of concern to experts, dealt with the time frame of interest, and were closely connected with the Army and its operational concept.

The process of identifying elements of change that threaten assumptions underlying the ALB-F concept requires hard, creative thinking. This part of the methodology is a synthesizing stage for which we have not yet developed an explicit, systematic procedure.

As a result, we must rely on the fleshed-out scenarios to establish the credibility of specific violated assumptions. We were able to identify four pairs of assumptions and elements of change, and we developed each pair into a future scenario. The resulting four scenarios, sketched briefly below, represent plausible future states of the world that would challenge the assumptions underlying the September 1990 version of ALB-F Umbrella Concept.

Alternative World #1

This world violates an assumption that the Army will continue to play a primary role in maintaining global stability across the operational continuum. It is a world in which the United Nations has become the primary global instrument for peace. The United States contributes primarily through its Navy and secondarily through its Air Force. The brunt of land operations in United Nations peacekeeping efforts is borne by smaller, competent armies from throughout the region of interest. This is a world in which conflict is primarily intranational rather than international.

Alternative World #2

This world violates an assumption that the United States will have rough parity in intelligence-gathering assets, long-range weapons, and mobility. The dominant military threat is a reemergent Russian republic that has, through judicious research and development efforts during the "capitalist" years, leapfrogged half a generation in long-range systems and countermeasures without having lost its air power. The United States once again has a formidable opponent whose capabilities threaten the efficacy of the ALB-F Umbrella Concept.

Alternative World #3

This world violates an assumption that the ALB-F Umbrella Concept will cover the preponderance of Army operations. This is a more benign world, one beginning to realize the magnitude of the environmental disaster it is creating and to understand the need to band together to solve some of the problems on a global scale. National leaders constantly interrupt combat training, calling on the Army to provide muscle and know-how in prolonged, manpower-intensive environmental cleanup projects.

Alternative World #4

This world violates an assumption that the Army's long-range systems will be militarily effective. This is a world that has enjoyed almost two decades of Persian Gulf-like offensive dominance thanks to stealth technologies and smart (now "brilliant") long-range weapons. The United States has led the way by concentrating its reduced military budgets on offensive technology. But now, emergent economic powers (including Russia and the Pacific Rim countries) are becoming threatened by the offensive arsenals of unstable neighbors and have poured their economic and scientific might into defensive weapons. These include effective beam weapons and now overmatch the most sophisticated offensive systems.

OBSERVATIONS

Using the Scenarios to Inform Long-Range Planning

In our analytic assistance to the Army DCSDOC, we applied the assumption-based methodology only through generation of alternative futures. The last stage of the methodology, using these futures to inform long-range planning, remains for the Army to conduct. There are two proper uses of scenarios generated in the way we have described.

First, these scenarios can be used to think about actions that should be taken in current planning to begin preparing for the eventuation of any of these worlds. Not many areas in Army affairs require that much lead time, but one comes distinctly to mind: technology investments. Technology investments, particularly in basic research and exploratory development, should be guided by actions the Army might take to address the challenges the four worlds pose (as well as those of other possible futures).

Second, these scenarios can be used to identify "signposts." These are events or trends that would suggest that the world had taken an important turn toward one of the challenges to the ALB-F concept. Such signposts, if they can be identified, would act as mechanisms for resolving uncertainty regarding the course of the future. With sufficient lead time, the Army could respond appropriately with a revised or new operational concept.

These two uses of the scenarios are possible because the assumption-based approach creates close connections between alternative futures and the problems doctrine writers face in the 1990s. This approach

generates a range of alternative futures, each of which represents a significant change from a key assumption underlying today's plans.

Improving the Assumption-Based Planning Methodology

It is perhaps obvious that assumption-based planning rests critically on the ability to identify the assumptions underlying the object of interest. Indeed, the explicit identification of assumptions is itself useful, since it gives planners a common framework. In our study, the search for assumptions was aided by an innovative method. The elements of change we identified from our initial list of assumptions yielded clues about other, unidentified assumptions. Iteratively following up on these clues yielded additional assumptions. Further improvements could be made to this procedure. It would be particularly useful to be able to focus on the specific assumptions whose violations would indeed make a difference. More generally, it would be desirable to develop a rudimentary theory of assumptions, to guide their discovery and formulation.

Robustness of the ALB-F Umbrella Concept

Because of the generality of the ALB-F Umbrella Concept (which is due both to its status as an umbrella concept and the requirement that it address a more complicated world than did, say, the Army Doctrine of 1982) it was difficult to come up with assumptions underlying it that might be violated in 25 to 30 years. While this difficulty indicates a robust concept, it also implies that doctrine writers will be challenged to develop the concept into a compelling guide to force structure development, training, etc. In the inevitable tension between breadth and specificity, recent world changes have forced ALB-F to be broader in its coverage of uncertainty and less useful as an instrument for driving the Concept-Based Requirement System.

ACKNOWLEDGMENTS

This work has benefitted greatly from a remarkably collegial relationship with the sponsor, the Deputy Chief of Staff for Concepts, Doctrine, and Development. In particular, we wish to thank BG Timothy Grogan, COL William McCauley, MAJ James Bowden, and MAJ John Gordon, whose support, comments, and guidance helped us understand the intricacies of Army 21. Additionally, we wish to thank LTC John Goodloe (CAC) and his staff of doctrine writers who generously gave of their time to make sure we had a correct understanding of their documents.

Many RAND colleagues also contributed to this report: The participants in the Delphi exercise provided the grist for our assessment of future concerns; Carl Builder and Richard Darilek offered cogent suggestions for improving the report; Rick Eden's clear understanding of the work and unerring communications instincts dramatically improved the exposition; and Bruce Don's broad knowledge of the Army kept us on track. Laurie Rennie's facility with manuscript preparation and unfailing good humor in the face of tight deadlines were particularly appreciated. Finally, a special debt of gratitude is due W. Michael Hix, who believed in the efficacy of this methodology from the outset. Without his steady guidance and attention to detail, and timely motivations, this report would be much less than it is.

2. AN INNOVATIVE APPROACH TO LONG-RANGE PLANNING

What we call the assumption-based approach to planning is a departure from the more common trend-based approach. Each has strengths and weaknesses and provides a roadmap for developing a future plan, but neither approach offers certainty in an uncertain future. Nevertheless, as we argue in this section, we believe the assumption-based approach has significant advantages in planning *at long range*. To provide a frame of reference, this section begins with a description of the trend-based approach to planning. The following subsection then describes the assumption-based approach. The third subsection compares the two approaches, and the last subsection spells out specifically how we see the assumption-based approach being applied to Army 21.

THE TREND-BASED APPROACH TO PLANNING

What is perhaps the most common approach to planning could be colloquially phrased something like this: Figure out what the world will be like in the future and then figure out what to do about it. Several techniques have been developed for thinking about what the world will be like. They can be broken down generally into four categories: trend extrapolation, expert judgment, scenario writing, and modeling. Any given approach to planning will use one or more of these techniques, but the one used most often with the common approach is trend extrapolation. Hence, we refer to this as the trend-based approach to planning.

The trend-based planning approach takes an outside-in perspective on the future: That is, it starts by looking at the outside world and then moves in to look at the organization or object of interest. Put another way, its initial focus is on events that are likely to occur in the outside world and its subsequent focus is on the potential effects of those events.

The specific steps in the trend-based approach are summarized as follows:

1. Gather trend data.
2. Select important trends.

3. Generate a world or worlds from important trends (typically a "most likely" world and excursions).
4. Make plans for dealing with the world(s) generated.

In a 1987 Memorandum of Understanding on the Architecture for the Future Army, TRADOC laid out an approach to the development of Army 21 that exemplified trend-based planning. The approach had four basic steps. The first was to identify trends in the world (through "environmental scanning"). After these trends were gathered, the second step was to identify the *key* trends—those that were felt to "drive" the future in an important way. The third step was to project from the key trends a "most likely" world 30 years in the future (with the provision that there may be important excursions from that "most likely" world). The fourth and final step was to contemplate the effect of the projected world(s) on Army doctrine and to develop an operational plan for dealing with the worlds.

Such a trend-based approach tends to produce a future world (or worlds) with high descriptive plausibility and a clear transition from the current world to the projected one(s). As with any futures methodology, this approach requires speculation and hard creative thinking. The most difficult part of this approach comes in describing the effects that the projected world(s)—and the trends that produced it (them)—have on the object of interest.

In 1987, TRADOC gathered trends and projected them 30 years into the future. (More precisely, TRADOC used a Delphi approach [expert judgment] to arrive at a consensus 30-year extrapolation of their gathered trends.) The key extrapolated trends were used to generate a "most likely" world, and the "think hard" work was begun on an operational concept for that world. Work was suspended at that point in part because the ALB-F work was deemed of more immediate importance and in part because the "most likely" world developed by TRADOC was not widely accepted as an adequate or accurate description of the future the Army might face 30 years out.

THE ASSUMPTION-BASED APPROACH TO PLANNING

What we perceived as fundamental problems with the trend-based approach (discussed in the next subsection) led us to a different approach in 1987, which is predicated on the following hypothesis:

The Army operational concept will change (or require change) if its underlying assumptions about the world change.

In contrast to the trend-based approach, the approach based on this hypothesis takes an inside-out perspective: It focuses first on the assumptions underlying the projected operational concept (ALB-F) and proceeds from there to look outside for things that could violate those assumptions. It is the focus on underlying assumptions and their potential for violation that prompted us to refer to this as an assumption-based approach.

Before proceeding with the details of the assumption-based methodology, it is important to say a few words about the soundness of the hypothesis. We have tested the hypothesis in two different ways: (1) We found historical examples in which the assumptions underlying an operational concept changed and, in turn, led to changes in the operational concept and (2) we had the good fortune to apply the methodology to the Army's doctrine in 1987. Since that time, unfolding events in Eastern Europe have corroborated one of the scenarios we said could lead to changes in the Army's operational concept, and the Army is changing its operational concept because of it. The details of each of these tests are in Appendix A.

The specific steps in the assumption-based approach are summarized as follows:

1. Identify assumptions underlying current operations.
2. Gather plausible long-range elements of change.
3. Identify elements of change that could upset current assumptions.
4. Generate a world for each violated assumption.
5. Develop signposts and hedging and shaping actions.

In other long-range planning efforts, identifying the assumptions about the world that underlie current operations or plans has been found to be a useful exercise all by itself. Forcing assumptions out into the open enables individuals charged with developing long-range plans to work from a common understanding. Even if the exercise goes no further, these assumptions can serve as the basis for discussions about future plans.

Again, there are a variety of ways to look for potential changes. In the next subsection, we will discuss why it is not advisable to use trend extrapolation for this step.

Identifying the assumptions that are threatened by potential changes in the future requires hard, creative thinking, since this synthesizing step has no formal, explicit procedure as yet.

For each threatened assumption, a future scenario would then be generated. Finally, actions either to avoid (hedging actions) or to encourage (shaping actions) are identified for each scenario. This step is facilitated by the way in which the scenarios have been generated, since the assumptions tie each future world directly to the operations of interest. This final step would also include the identification of signpost events that, were they to occur, would indicate that the world has taken a definite turn toward a given future scenario.

Although we developed the assumption-based methodology to support development of Army 21, we have become convinced that it is generally applicable to planning under great uncertainty.

COMPARING THE TWO APPROACHES TO PLANNING

Table 2.1 shows the basic contrasts between the two planning approaches.

The trend-based approach is well suited to projecting a single scenario out over a short time range. This produces a world with high descriptive content and high plausibility. Such a world is well suited to producing an operational plan that takes advantage of the short-term trends that produced the projected scenario. Commercial industries, particularly fad-oriented ones, take full advantage of this type of planning.

The farther into the future one wishes to plan, the less accurate trend extrapolations are going to be in general. For long-range planning, there are few, if any, trend extrapolations that are likely to be accurate enough to give much plausibility to a scenario built on them. The less plausible a "most likely" scenario is, the more plausible the sum of all possible alternative scenarios is. The most likely thing about a "most likely" world 25 years out is that it will not come to pass. Not only are trend extrapolations inappropriate for generating

Table 2.1

Contrasting Features of Trend-Based and Assumption-Based Planning Approaches

Trend-Based Approach	Assumption-Based Approach
Short-range projection	Long-range speculation
Single-world generation	Multiple world generation
Opportunistic planning	Fail-safe planning
Operational plan	Hedging plans

a scenario 25 years out, but *any* single scenario 25 years out, no matter how it is generated, is not a good foundation for speculations about the future.

The assumptions underlying current operations or plans are likely to be robust for the near future. That is, violating them in the near term is unlikely (unless the current operations or plans have been poorly prepared). It is only farther out in time that the assumptions develop important vulnerabilities; moreover, when one assumption becomes vulnerable, it is likely that one or more others will as well. The likelihood of assumption violation over the long term implies the existence of several alternative scenarios, all with significant plausibility but not all simultaneously realizable. Planning to these alternatives leads both to hedging (and shaping) actions and fail-safe planning. (The latter is a hallmark of the military services: A good example at the tactical level is "information preparation of the battlefield," with named and target areas of interest corresponding to signposts and alternative "own courses of action" corresponding to hedging and shaping actions.)

In summary, the trend-based approach is generally more suited to short-range planning than to long-range planning, while the opposite is true for assumption-based planning. However, assumption-based planning is also well suited for short-range planning in highly unstable periods when major assumptions underlying current operations face a high likelihood of being violated. Many people, including the authors, believe that the world entered just such an era in the late 1980s.

APPLYING THE ASSUMPTION-BASED APPROACH TO ARMY 21

The basic long-range planning question that the Army DCS for Concepts, Doctrine, and Development would like to answer is this: What challenges might there be in 25 to 30 years to the current operational concept (the ALB-F Umbrella Concept)? If one presumes that this operational concept is appropriate for the current and near-future world, this is equivalent to asking what might *change* in 25 to 30 years that would challenge the current concept. This, in turn, is equivalent to asking what *assumptions* that the operational concept makes about the world *might change* in 25 to 30 years. This formulation is the starting point for our assumption-based methodology.

This is a promising starting point for the methodology because it should be easier to contemplate changes to the current world than to

predict a future world. Note that not all changes in the world will require changes to the operational concept; only changes in the assumptions that specifically underlie the operational concept will require changing it. Since those changes are tied specifically to the world that was assumed during the development of the ALB-F Umbrella Concept, they are the "right" changes to contemplate. And if the changes are plausible, they point to plausible worlds that would challenge the concept.

As applied to Army 21, the five major steps of the assumption-based methodology proceed as follows:

1. Identify the assumptions underlying the ALB-F Umbrella Concept.
2. Identify elements of change in the world 25 to 30 years from now that bear on the Army's operational concept. Elements of change include anything that represents change in the world: a (nonconstant) trend that results in a change, a (perhaps catastrophic) event, a collection of events and trends that together produce a particular change, etc.
3. Look for specific elements of change that would violate specific assumptions.
4. Generate scenarios based on those assumption-violating elements.
5. Use those scenarios to develop hedging and shaping actions to be taken immediately and signposts to indicate that a given scenario might be eventuating.

We demonstrated the first four of these steps in our application of the methodology to Army 21.

The first step is not generally an easy task. In our undertaking, however, the timing was propitious. We were able to develop a preliminary set of assumptions through a reading of the ALB-F Umbrella Concept and then to check those assumptions, through interviews, with the concept writers themselves. Careful reading of the documents associated with the development of the ALB-F Umbrella Concept and a discussion of those assumptions with the original framers of the concept were the basis of the assumptions presented in Section 3.

For the second step, we used the Delphi technique to gather expert opinion. That technique is described in some detail in Section 4.

Whether the search for assumption-violating elements of change is concurrent with or separate from the identification of the elements of change, this is a "think hard" or creative part of the methodology. In

our case, a group of experts identified the elements of change (via the Delphi technique). A much smaller group then took the elements and the assumptions and, in discussion sessions, identified elements of change that would threaten specific assumptions (Step 3).

At this point, the methodology yielded a set of threatened assumptions and their associated elements of change. The next step was to expand the violated assumptions into future scenarios, including sketches of the transition from the current world to a world encompassing the change. This step serves two purposes. First, the development of scenarios helps make the plausibility of the elements of change compelling. In addition, these scenarios assist in the identification of hedging and shaping actions and of signposts to look for in world events that might indicate that the changes are coming to pass.¹

Generating the scenarios is as far as we applied the assumption-based methodology in support of Army 21. TRADOC subsequently fleshed out the scenarios in a seminar and used the results of that seminar to perform the fifth step in the methodology, the identification of signposts and the development of hedging and shaping actions. Those products will form the basis for the Army 21 document to be published by TRADOC.

¹See Peter Schwartz, *The Art of the Long View*, Doubleday, New York, 1991, pp. 7-10, for an interesting discussion of the use of signposts.

3. ASSUMPTIONS UNDERLYING THE ALB-F UMBRELLA CONCEPT

CHOOSING A VERSION OF THE ARMY'S OPERATIONAL CONCEPT

One goal of the Army 21 process is to inform the Army about changes that might be required in its operational concept in the future. The current Army operational concept is AirLand Battle (as codified primarily in TRADOC Pamphlet 525-5 [dated 1981], FM 100-5 [dated 1986], and supporting documents). A scheduled revision of FM 100-5, however, is expected to be based on the ALB-F Umbrella Concept (dated September 1990) developed at the Combined Arms Center (CAC). The revision of FM 100-5 is intended to update the Army's operational concept and bring it into consonance with the dramatic changes that have been happening in Eastern Europe and the Persian Gulf. At this point, the ALB-F Umbrella Concept is still in draft form and is being evaluated throughout the Army.

Our methodology depends on identifying the assumptions about the world that underlie the Army's operational concept. In this light, it is inappropriate to use the assumptions underlying FM 100-5, but it is also somewhat premature to use those underlying the ALB-F Umbrella Concept. For our purposes, we chose the latter course, and we chose September 1990 as a specific cutoff date. Since then, the operational concept has had its name changed to ALO and has undergone further revision. To emphasize the cutoff date, we will continue to use the name ALB-F. While the changes between ALO and ALB-F do not appear to affect our analysis dramatically, this distinction should prevent any confusion. The three documents we chose as references are the following:

- CAC's final coordinating draft, "AirLand Battle-Future Umbrella Concept" (10 September 1990)
- CAC's final coordinating draft, "Evolution of the Army: Using Insights from AirLand Battle-Future" (11 September 1990)
- CAC ALB-F Briefing on 5 October 1990.

These documents were the final output of the development team at the CAC at Fort Leavenworth. This was a convenient "fire break" in the development process. In addition, it provided us with the opportunity of interviewing members of the development team (which we

did) about assumptions at a point when their work was in stasis.¹ Although some of the assumptions underlying the September 1990 version have changed, the changes are minor, and we are hopeful that any further changes will also be minor. In a formal sense, then, this analysis must be considered preliminary until the official acceptance of the operational concept.

IDENTIFYING THE UNDERLYING ASSUMPTIONS

In reading the ALB-F documents and talking with the developers, our primary goal was to understand as much as possible about the world that the ALB-F operational concept was addressing. The primary assumptions made in developing the ALB-F concept are about matters of concern to the Army and its missions. As a result, some of the assumptions are about how the Army will react and behave. While these are of interest in other contexts, our primary interest is in the assumptions about the world that the Army has little or no control over. An important point to be made in this regard is the clear distinction between whether the *assumptions* underlying Army doctrine are correct and whether the *doctrine* itself is correct. That is, it is one thing to intuit the nature of the global security environment correctly and another to decide what to do about it correctly. The following work concentrates on the former and specifically excludes discussion of the latter.

The assumptions we have tried to identify, then, are assumptions about the world over which the Army has little or no control and upon which the ALB-F Umbrella Concept depends.

The September 1990 version of the ALB-F Umbrella Concept concentrates on combat operations. Most of the assumptions we identify below, then, will concern the nature of combat. In addition, there are two assumptions that came, not directly from the ALB-F documents, but from the process of looking at the elements of change and ALB-F assumptions for threatened assumptions (as described in Section 5).

Combat Operation Assumptions

In some sense, if doctrine is apt it should be readable as a *history* of any future conflict. Beyond knowing who won, several aspects of the conflict will be of interest to careful observers. Standard questions

¹We met with Lieutenant Colonel Goodloe of CAC and his staff in March 1991. The assumptions presented in this section were reviewed by his team and represent a common understanding of the key assumptions underlying ALB-F.

include the following: Who took part in the conflict? What weapons and forces were used? What were the basic fighting styles of the major protagonists? What "caused" the fighting? What were the general characteristics of the fighting? Where was it fought? These six categories—participants, materiel, styles, rationale, general characteristics, location—are used to facilitate a systematic search for assumptions.

The assumptions come in two types: those explicitly mentioned in the source documents and those that must be inferred from what has been written. For reference, Table 3.1 lists the complete set of assumptions we have identified, broken out by whether they were explicit in the ALB-F documentation or conversations with the developers or whether they are implicit. Detailed discussions of each assumption follow; note that the discussions are organized according to the categories above.

Participants—U.S. ALB-F leaves little doubt that the U.S. Army will coordinate and cooperate both with other services and other armies. In addition, and particularly in conflict and peacetime contingencies, it will coordinate and cooperate with U.S. civilian agencies, as well as with those of a host nation. Thus, the two explicit assumptions in this category are the following:

- The Army will conduct joint operations (with other services).
- The Army will conduct combined or coalition operations (with armies or agencies from other countries).

Participants—Enemy. There was little certainty in FM 100-5 about exactly who the enemy would be, although characteristics of the enemy were clearly stated ("numerous, well-equipped and sophisticated"). But even that certainty is missing from ALB-F (and, in fairness, perhaps from the world). The Soviet Union is singled out as the only nation that could threaten U.S. survival, but much of the worry from that threat is diminishing. What does come across in ALB-F is the likelihood that, throughout the conflict continuum, the United States is likely to be facing third-world entities. In its geopolitical context, ALB-F details increasing third-world economic and military capabilities and increasing pressures that could lead, through political and/or social unrest, to actions requiring U.S. military intervention. ALB-F specifically calls out as critical U.S. interests "resources located in, transiting through, controlled by, or capable of

Table 3.1**The Assumptions Underlying the ALB-F Umbrella Concept****Explicit**

- The Army will conduct joint operations (with other services).
- The Army will conduct combined or coalition operations (with armies or agencies from other countries).
- The Army will have
 - Timely, accurate intelligence and targeting information
 - Precision long-range fire capability
 - Reliable command and control
 - Highly mobile, rapidly deployable systems
 - Sealift and airlift adequate for rapid deployment.
- Some potential enemies will have significant quantities of high-quality weapons (including those of mass destruction) as sophisticated or more so than those of the United States.
- The Army will not be heavily forward deployed in the conflict arenas of greatest concern.
- The enemy can and may use weapons of mass destruction.
- Protracted conflicts generally favor the enemy.
- The Army will prefer nonlinear operations, because they take advantage of its relative strengths.
- The battlefield will be greatly extended, with the enemy engaged throughout.
- Battlefields will be nonlinear, with unavoidable intermingling of opposing forces.
- Battle tempo will be unprecedented in violence but sporadic.

Implicit

- The enemy may come from anywhere but is more likely to come from the less-developed countries.
- The Army will have at least rough parity in intelligence-gathering assets, long-range weapons, and mobility.
- Our long-range weapons will be militarily effective.
- The Army will out-execute the opposition.
- The Army will continue to play a primary role in maintaining global stability across the operational continuum.
- The next major conflict is likely to be some distance from the United States.
- There is a separately constituted Army.
- The preponderance of Army operations will be covered by ALB-F.

being destroyed by third world nations or factions." In other words, the only information on who the enemy might be is implicit:

- The enemy may come from anywhere, but is more likely to come from the less-developed countries.

Materiel—U.S. The Army will clearly be significantly smaller than it was in 1988. Further, because of budgetary pressures, the Army's ability to introduce new high-technology systems into the force will be severely curtailed. In fact, ALB-F states that "the decision to resource specific technologies will preclude others" and "making the right choice is the paramount decision." Among other things, this will result in the Army operating "with a mix of old and new systems in 2004." Nonetheless, the umbrella concept requires several military capabilities at or beyond those of the current Army, and these are specifically called out.

- The Army will have:
 - Timely, accurate intelligence and targeting information
 - Precision long-range fire capability
 - Reliable command and control
 - Highly mobile, rapidly deployable systems
 - Sealift and airlift adequate for rapid deployment.

There are also important implicit assumptions that the Army will have intelligence-gathering assets, long-range weapons, and mobility systems that will be militarily effective against any enemy.

- The Army will have at least rough parity in intelligence-gathering assets, long-range weapons and mobility.
- Our long-range systems will be militarily effective.

Materiel—Enemy. The picture of the enemy weapons systems is, again, very fuzzy. There are only two explicit statements that shed light on the types of weapons the Army might face. The first is that the United States "will have little lasting significant advantage on the battlefield in terms of a specific system." The other comes from the geopolitical context and speaks to the "aggressive procurement of modern, lethal weapons" in the third world. There are also specific indications that the enemy could have nuclear, chemical, and biological weapons, particularly the latter two. FM 100-5 specifically stated that enemy weapons will outnumber those of the Army. This phrase

is conspicuously absent from ALB-F, and much of the writing seems to suggest that the enemy will not match us in both sophistication and numbers, as was feared in FM 100-5. Here the explicit assumption is

- Some potential enemies will have significant quantities of high-quality weapons (including those of mass destruction) as sophisticated or more so than those of the Army.

Style—U.S. Much of the U.S. style of fighting is under control of the Army and thus of less interest to this endeavor. Those battle characteristics driven more by the technologies and force structures of modern armies are covered in the “General Characteristics of the Fighting” subsection below. There are, however, two assumptions in ALB-F that affect U.S. combat style and that could be dictated by elements outside the Army. The first has to do with Army deployments. While FM 100-5 assumed implicitly that the Army would be heavily forward deployed in the conflict areas of greatest concern, ALB-F explicitly assumes that the Army will not be.

- The Army will not be heavily forward deployed in the conflict areas of greatest concern.

ALB-F's second assumption is more implicit. The developers have assumed that the Army will out-execute its opponents. While this is somewhat a function of Army training, there is a significant element the Army cannot control.

- The Army will out-execute the opposition.

Style—Enemy. The only significant element of enemy style discernible in ALB-F is the willingness to use nuclear, chemical, and biological weapons. The only other visible evidence of the enemy style is an apparent willingness to mirror U.S. style, at least as it pertains to massing of forces and use of long-range fires to attack U.S. forces.

- The enemy can and may use weapons of mass destruction.

Rationale—U.S. More to the heart of the assumptions about how the Army will fight is the matter of why they would or should fight in that way. This is distinct from the matter of why they would choose to fight in a given situation and sheds light on changes that might occur in the constraints that the concept developers see in determining

the Army's role in the coming security environment. Much of the avowed, nonlinear style seems to stem from two basic constraints.

- Protracted conflicts generally favor the enemy.
- The Army will prefer nonlinear operations because they capitalize on relative U.S. strengths.

There is, however, a third rationale that is more implicit and is stated most explicitly in the phrase "today and in the future, U.S. national interests will continue to transcend the physical defense of American soil and will be based on the maintenance of a degree of global stability which preserves U.S. national values."

- The Army will continue to play a primary role in maintaining global stability across the operational continuum.

Rationale—Enemy. There is nothing explicitly written about why the enemy might be fighting or why he has chosen what the United States knows about his doctrine and operational concepts. There were a few implicit suggestions about pressures that third-world countries might be feeling, but all could only remotely be presumed as a rationale for a warfighting style.

General Characteristics of the Fighting. There are several references to the nature of the fighting independent of the individual styles of the participants. These characteristics appear to be determined primarily by the characteristics of modern weapon systems. The introduction of precise, long-range weapons has extended the battlefield in planners' minds both to the front and rear. The increased speed and autonomy of many modern weapon systems has brought visions of nonlinear battlefields with unavoidable intermingling of opposing forces. Because of the nature of the U.S. style, however, the notion of continuous battle that was evident in FM 100-5 has been replaced by a more sporadic vision of destruction.

- The battlefield will be greatly extended, with the enemy engaged throughout.
- Battlefields will be nonlinear, with unavoidable intermingling of opposing forces.
- Battle tempo will be unprecedented in violence but sporadic.

Location. The one assumption about where future combat might take place that finds voice in ALB-F is that it is likely to be some dis-

tance from the United States. There is specific mention of the diminishing likelihood that it will take place in Europe. Where it actually might occur must be inferred from the worry over the deployability of forces and the requirements to get to combat areas in a hurry.

- The next major conflict is likely to be some distance from the United States.

Other Assumptions

Two other assumptions in ALB-F are implicit but did not come directly from reading ALB-F documentation or talking with its developers. These assumptions came instead from the process of looking at the elements of change identified in the Delphi exercise and thinking about the assumptions that underlie ALB-F.

The first has to do with the Army as a separate, independent service. While this is a trivial assumption, elements of change suggest that it might not be the case in the future. The question of whether the operational concept might have to change if the Army were not separate is distinct from whether or not there is a separate Army, and this question needs to be considered through a scenario that suggests changes must be made.

The second assumption is, perhaps, an artifact of the provisional status of the ALB-F Umbrella Concept. As mentioned above, ALB-F concentrates on combat aspects of the operational continuum. On the other hand, it is explicit in ALB-F that the Army must be prepared for a much larger operational continuum than in the past. If this ALB-F Umbrella Concept is complete and correct, it contains the implicit assumption that any operations short of combat are lesser included cases of combat preparations.

- There is a separately constituted Army.
- The preponderance of Army operations will be covered by ALB-F.

4. VIOLATED ASSUMPTIONS AND ALTERNATIVE FUTURES

The second step of our methodology, as described in Section 2, consists of identifying plausible elements of change in the world that could occur during a 25-to-30-year time frame *and* that could affect the Army's operational concept by violating an underlying assumption. We relied on a structured form of gathering expert opinion—the Delphi process—to collect this information. As described below, the Delphi was designed to aid the identification of interesting future challenges to the ALB-F Umbrella Concept. The output of the Delphi was a series of questions related to elements of change that might affect the Army's operational concept.

In addition to identifying the elements of change for use in this research, we were also afforded an opportunity to explore the invariance of these elements of change by comparing the results of the Delphi run in 1990 for this research to a similar one run in 1987. The results of that comparison are described in Appendix B.

THE DELPHI EXERCISE

Originally conceived at RAND as a means of eliciting group opinion without the influence of a dominant member of the group, the Delphi methodology has a long and varied history.¹ The problems with eliciting expert opinion through small group discussions suggested that a method that would preserve the anonymity of the individual group members was worth exploring. The methodology that evolved was distinguished by the characteristics of anonymity, multiple iterations feeding back responses to the individual participants, and quantitative summary of the group response.² Although typically used to develop consensus among experts, Delphis have also been used heuristically to help explore a topic more completely than might be possible with input from only one or two people. We have used the Delphi process in this heuristic mode.

¹See Harold Sackman, *Delphi Critique*, Lexington Books, Massachusetts, 1975, p. 1.

²Norman C. Dalkey, *The Delphi Method: An Experimental Study of Group Opinion*, RAND, RM-5888-PR, June 1968.

In developing the question that served as the starting point for our Delphi experiment, we were concerned with breaking the lock that trend extrapolation typically has on long-range military planning. As we noted in Section 1, in looking out to the far future (25 years or more), simple trend extrapolation runs the risk of attributing *plausibility* to trends that have very little *likelihood* of obtaining. We placed a high premium in the Delphi on denying respondents information about world events leading up to the period in question, as a means of minimizing the natural tendency to extrapolate from current events. Our hope was that this would help focus their attention on longer-term issues critical to military planning.

To move the participants in this direction, we set them up with an artificial situation:

You have been asleep for the last 30 years. You know nothing about the world at this point except that there has been no major nuclear war in the intervening years. You are asked to guess what the Army's roles, missions, and operational concept are [presuming they are well suited to the new world]. Before you answer, you may ask 10 questions about today's world. Each question must have a yes or no answer and none can be contingent on a previous question.

What is your list of questions?

By denying them knowledge of the world for 30 years, we hoped to focus the participants, as much as possible, on long-range issues relevant to the Army concept. By restricting them to questions with "yes" or "no" answers, we hoped to focus their attention on concrete aspects of the future.

We conducted the Delphi in three rounds. In the first round, each respondent was asked to develop his list of questions independently. In the second round, the entire list of questions generated by all the respondents was circulated, and each participant was asked to reconsider his own questions in light of those that others had identified. A new set of questions (ten per respondent) was generated. In the final round, each person was sent his list of questions from the second round and asked both to rank them and to explain the connection between his questions and changes in the Army operational concept.

Like any attempt to capture expert opinion, a Delphi is only as broad and comprehensive as the sample of experts queried. Although our sample size is both relatively small (16 people began the experiment; only 14 completed the third round) and institutionally limited (all respondents were at RAND, but almost half are or were active-duty of-

ficers assigned to RAND in the Army Fellows Program), we believe that we have captured much of the relevant expertise desired. Our sample included senior national security analysts with knowledge of regional issues, strategic matters, technology, manpower, and defense planning, and experience in the State Department, the Office of the Secretary of Defense, the Congressional Budget Office, and the Services. The Army fellows represent the combat, combat support, and combat service support branches, and they have a broad range of experience from field duty through high-level staff assignments.

By structuring the Delphi in the way we did, the questions yield plausible elements of change 25 to 30 years in the future that are related to the Army and its operational concept. There are four important aspects to that yield:

1. The questions *do* speak to elements of change. To state what perhaps is obvious, respondents would not ask questions were they not concerned about potential, impending change. (No one, for example, asked if the sun still came up in the morning or if the seas still contained water.)
2. The elements of change have plausibility. The fact that experts are concerned about the changes gives them plausibility, and the Delphi process itself works toward a "sanity check" on that plausibility.
3. The elements of change are specifically aimed at a time 25 to 30 years in the future. Denying respondents knowledge of the intervening years makes them focus on that future world.
4. The questions are directly related to the Army and its operational concept. This focus on the Army's concept is what facilitates the third step in our methodology, looking for specific elements of change that could violate specific assumptions.

IDENTIFYING ELEMENTS OF CHANGE

As defined in Section 2, an element of change is anything that represents a change in the world. The questions generated in the Delphi point to those elements of change either directly (for example, by asking if certain conditions have changed) or indirectly (through the concern expressed about some aspect of the world).

The questions themselves represent the elements of change and are so used in the next step of the methodology. Appendix C lists all the

questions. There are over 150 questions, however, and this large number begs for a summary of some sort.

Table 4.1 is one such summary. In it, the elements of change represented by the 150 questions are categorized into five domains: international, threat, military, domestic, and technology. These are obviously very general categories and as such do not provide deep

Table 4.1
Number of Respondents in Subcategories
(Round 3, N = 14)

Category	Number
International	
Economics	7
Arms control	1
Alliances	10
UN	3
Global military force levels	2
Superpowers	3
Soviet Union	2
Regional	3
Ideology	4
Other	3
Subtotal	38
Threat	
Terrorism	5
LIC	1
New hegemony	3
Domestic/border	2
What's the threat?	8
Weapons proliferation	2
Nuclear, biological, and chemical weapons use	2
Subtotal	23
Military	
Army size and capability	7
Service structure	6
Force deployments	4
Combat experience	9
Subtotal	26
Domestic	
National will	1
Value of military force	3
Defense budget	4
"Policeman"	4
Importation of raw materials	4
Environment	3
Other	3
Subtotal	22
Technology	8
Subtotal	8

insight. But within these categories are some specific clusters of elements of change that merit explanation.

As the table shows, questions about the international climate and the nature of the threat overwhelmed all other issues, suggesting great uncertainty among the experts about the future course of events. Table 4.1 also provides an additional breakdown by subcategory. This breakdown served as the basis for linking the elements of change to the assumptions to develop plausible scenarios.

IDENTIFYING VULNERABLE ASSUMPTIONS

After determining the elements of change and the assumptions from the ALB-F Umbrella Concept, we were in the position to identify those assumptions that appeared most vulnerable to the potential changes identified through the Delphi. Having identified those assumptions, we then constructed alternative scenarios that built upon the elements of change identified through our Delphi experiment, as well as the conventional wisdom in the analytic community about future events, to demonstrate the *plausibility* of potential change and the *vulnerability* of ALB-F to the changes described in the scenarios. As indicated in Section 1, the scenarios were the primary output of our work as originally envisioned, before further development and application of our assumption-based planning approach became an additional objective.

It is important to note that our methodology produces scenarios that are not intended to predict events. In this respect, the methodology differs radically from the trend-based approach. Rather, the scenarios generated in the assumption-based methodology serve two purposes: (1) to make more compelling the plausibility of elements of change and their violation of key assumptions underlying current operational concepts and (2) to provide a basis for monitoring future events and deciding whether action either to hedge against or shape those events is warranted. In laying out a course of events, the scenarios provide signposts that, if they appear, indicate the need for action in order to maintain the aptness of the umbrella concept.

Identifying elements of change that violate key assumptions requires hard, creative thinking in the assumption-based methodology. We have not yet developed an explicit, systematic procedure for performing this synthesizing task. There are a variety of ways to search for such pairs of violated assumptions and elements of change, but little more rigor than that can be brought to what must, at this point, be a creative process.

In our case, we identified potential violated-assumption–element-of-change pairs during discussion sessions with the group that had both administered the Delphi and participated in the assumption identification. The resulting inevitable biases are, we think, ameliorated both by having discussed the assumptions with the framers of the operational concept and by collecting the wisdom of more than a dozen colleagues on the elements of change.

Four assumption-element pairs were identified for expansion into full-blown future scenarios. The four pairs are shown in Table 4.2. The elements of change are shown in the form of the question asked as part of the Delphi. In each case, there is a secondary element of change or question that helped focus the specific alternative future with its assumption-element pair. Three of these secondary elements

Table 4.2
Assumption and Element-of-Change Pairs

Assumption	Element of Change
The Army will continue to play a primary role in maintaining global stability across the operational continuum.	Does the United States still maintain the role of world policeman, either unilaterally or predominantly? [Has the United Nations become a cohesive body with sufficient military clout to enforce sanctions?]
The Army will have at least rough parity in intelligence-gathering assets, long-range weapons, and mobility.	Is there a nation with a military force that could be construed as a threat to the United States or its national policy? [Is there a competitive military superpower, like the Soviet Union/Russian Republic (or rearmed Japan or emergent Brazil) that can destroy the United States?]
The preponderance of Army operations will be covered by ALB-F.	Did the Army take on more domestic [missions]? [Are there any severe threats to the global environment that could lead to U.S. intervention for protection of the environment?]
Our long-range systems will be militarily effective.	Have there been substantial breakthroughs in weapons, propulsion, and transportation technologies? [Are projectile weapons still the predominant force on the battlefield?]

came directly from comparing the assumptions with the elements of change identified in the Delphi. The fourth came from contemplating the assumptions and the elements of change.

DEVELOPING FUTURE SCENARIOS

One general point is particularly important to make before detailing the scenarios. The following scenarios are not intended to be statements of how the world *must* evolve for the given element of change to eventuate. As stated earlier, the scenarios are intended only to add to the plausibility of the world evolving from today's world into one in which the associated assumption underlying the operational concept is undermined. If there are more plausible evolutions in the reader's mind that lead to a future containing the element of change, so much the better. If, however, neither the evolution described nor any other is compelling to the reader, we have failed, and the reader is justified in dismissing the threat to the operational concept.

To aid in writing the scenarios, we wanted a list of rough consensus trends from the long-range planning community—that is, a list of short-term trends with easy recognition and high face validity in the current long-range planning community. In writing the scenarios, we extrapolated those trends and described how they “came out” in the world as it evolved. In so doing, we paid particular attention to certain aspects of today's world that people think will persist and then connected the scenarios with those dominant trends.

For these purposes, the trends did not need to be scientifically or analytically derived. A set of such trends from a single published source would have sufficed. In actuality, we looked to three recent documents dealing with the future:

- National Security Strategy of the US, The White House (January 1990)
- *1991 Army Long-Range Planning Guidance*
- *The Army National Guard 1990-2020 Long-Range Planning Guidance* (December 1990)

These sources are not necessarily independent, neither was a rigorous selection procedure used to derive the “consensus” trends. The resulting trends, as selected from the documents and as used to guide writing each of the scenarios below, are

1. Soviet Union will be increasingly preoccupied with internal development while maintaining formidable military capabilities.
2. Regional conflicts will become increasingly violent.
3. Advanced weaponry will proliferate.
4. International violence and lawlessness associated with terrorism and drug trafficking will increase.
5. The economic world will become multipolar and increasingly competitive.
6. Reliance on southwest Asian oil will continue.
7. Quality of life issues (social program, the environment, etc.) will become increasingly salient.

ALTERNATIVE SCENARIOS

Having explained how we developed the four scenarios, we will now present them. For each one, we will identify the violated assumption, describe the scenario, and explain how the seven trends played out.

Alternative Scenario #1

This world violates the following assumption: "The Army will continue to play a primary role in maintaining global stability across the operational continuum."

Scenario Description. Recall that the Delphi experiment identified the issue of whether the United States would continue to play the role of the world's policeman as a plausible element of change. In this alternative world, the U.S. Army is *no longer* the preeminent "cop on the block." American dominance of the world political scene slowly dissipates through a combination of events and policy choices: domestic pressures on the budget, decreased industrial competitiveness, pressures from multinationals to redefine the concept of national interest, and the ascendance of the United Nations.

As the arbiter of international disputes and the "commander in chief" cobbling together military forces, the UN greatly affected the fortunes of the various military services. The U.S. Navy, long recognized as the premier naval force in the world, has made the major U.S. contribution to UN-led force actions over the past 10 years. The Air Force was not far behind. The Army, however, faced much stiffer competition from the armies of UN-member states. Ultimately, the U.S. Army was passed over as a result of political infighting between sev-

eral small member states, who argued that, in the new world order, it was not seemly for the United States to dominate the coalition forces as it had in Desert Storm.

Because the Army was not playing a major role in UN military actions, it was on shaky ground when arguing for force structure before a budget-constrained Congress. Over time, the Army began to shrink both in absolute and relative terms. The dominant mission came to be defense of the Continental United States as the Army retreated to its historical roots: border defense and civil works.

How the Trends Played Out. The seven consensus trends have played out as follows:

- The Soviet³ leadership continues to focus on internal affairs as it tries to adapt to new borders with former republics. Although still a significant military force, there have been no generational improvements to speak of and no indications that the Soviets are in any position to act adventurously. In fact, they have played an active role in the UN efforts, lending those efforts the credence they lacked in the past.
- Political disputes over ideology, resources, and markets continue to flare up in Central America, Southeast Asia, the Middle East, and Africa. Security council sessions have been held repeatedly and have consistently sent the same message: The UN is basically intent on *status quo* national boundaries. When those are threatened, the security council is typically able to mobilize support for action. *International* conflict is not tolerated; *intranational* strife is as intractable as ever in the UN framework and bubbles up relatively frequently.
- Advanced weaponry has proliferated, resulting in a number of small, elite, well-equipped armies throughout the conflict regions of the world. While not the equal of the U.S. Army in the 1990s, they are increasingly called upon for UN efforts because of their competence and their proximity to the conflict region.
- The international violence and lawlessness long associated with drug trafficking and terrorism have changed in nature as "designer" drugs have come on the scene. The drugs of choice tend to be designer chemicals rather than natural ones; thus, home-

³This and subsequent references to a future Soviet Union reflect the fact that the Delphi was conducted before the collapse of the Soviet Union at the end of 1991. The scenarios are not materially affected if one substitutes "Russian Republic" for "Soviet Union" and "Russian" for "Soviet."

grown chemists are more of a threat than smugglers at the border. Terrorist acts backed by drug money dry up, and those that remain more clearly reflect indigenous political concerns.

- The relatively benign international trading climate has provided many of the smaller, less developed countries an opportunity to build up their credit lines. Many have used their newly found purchasing power to buy military forces.
- The Middle East is still the dominant supplier of oil, which, along with strategic materials, continues to deplete at a rapid rate.
- Quality-of-life issues continue to dominate the domestic debate in the industrialized world. Western Europeans are increasingly frustrated by the lack of progress in cleaning up the environmental damage caused by the Communists in their backyard. Those threatened are growing strident, and the UN has become the accepted forum for debating the issues—strengthening its world role. The greenhouse effect has been noticeable for a decade, and desertification has made inroads in previously fertile areas in North America. The aging populations of the industrialized democracies are also putting significant pressure on domestic budgets for social-support programs.

Summary of Alternative Scenario #1. The primary feature of this world, then, is that the resulting smaller Army has turned primarily to the missions of CONUS defense and infrastructure support (Corps of Engineer-type activities). In essence, the Army has lost its mandate to wage large-scale ground combat. Its focus is more on national defense (against what remains of the drug threat and terrorism and, increasingly, against unlawful immigration) and national service (primarily in environmental cleanup).

Alternative Scenario #2

This world violates the following assumption: "The Army will have at least rough parity in intelligence-gathering assets, long-range weapons, and mobility."

Scenario Description. Again, the Delphi experiment provides some preliminary guidance. Respondents identified the issue of a reemergent, belligerent Soviet Union as a potential element of change. In this alternative world, that has come to pass. We find a leaner, meaner Russian Republic facing off against hostile former member states. Boris Yeltsin tried, and failed, to bring free-market practices to the Republic; redirection of the economy simply required too many

individual sacrifices. The military stepped in and took over the government after a series of increasingly violent food riots. The treaty of 1998 between the United States and the Baltics is causing the United States to rethink its military roles and missions.

How the Trends Played Out. The seven consensus trends have played out as follows:

- The Soviet preoccupation with internal developments has not reduced either their interest in or commitment to substantial force improvement. During the time the military was out of power, it concentrated on research and development behind the scenes; when the military came to power, it moved quickly to modernize its armed forces. It essentially leapfrogged half a generation in long-range weaponry and countermeasure systems, while maintaining a strong air capability. Its defensive orientation makes it a much more formidable challenge than Iraq was in 1991.
- Continuing regional difficulties in the Middle East, Central America, and Asia were evaluated strictly in terms of national interest threatened by a given conflict. For the United States, that meant that there was less and less rationale (with the exception of the Middle East) for playing an active role.
- Advanced weaponry has proliferated, but the weapons sold on the open market have not improved dramatically. The United States, while increasingly interested in modernization, has been hampered by budget constraints. Countries are continuing to buy up the last of the cruise missiles from the late 1990s. Western intelligence sources begin to notice that the Soviets are selling some of their higher-end equipment and begin to worry about replacements in the Soviet pipeline.
- Terrorism and lawlessness associated with drug trafficking continue, but have not grown to the extent many predicted they would before the turn of the century.
- Economic matters continue to dominate international discourse, and the interconnectedness of national economies requires increasing management attention. The world had come to believe that wars were fading as instruments of national power in the face of the leverage demonstrated by the multinationals.
- The world continues to rely on the relatively cheap oil from the Middle East, and the Western economies are increasingly dependent on uninterrupted sources of oil.

- As in the previous scenario, quality-of-life issues continue to dominate domestic debate across the globe.

Summary of Alternative Scenario #2. The primary feature of this world is that the United States now finds itself facing a newly belligerent Soviet Union with significant assets in long-range weapons and stand-off systems equal or superior to American systems and with a defensive mindset.

Alternative Scenario #3

This world violates the following assumption: "The preponderance of Army operations will be covered by ALB-F."

Scenario Description. The Delphi raised the issue of environmental protection and intervention as a possible element of change with effects on the Army mission. Although there are worlds that could be drawn around similar concerns, this is a world in which concern for the environment is the dominant worry of the industrialized nations, and threats to the environment are increasingly seen as a security matter. Environmental degradation is widespread and mounting. In Europe, the impact of Communist energy production methods and industrial development have long since been felt. Remedial actions taken early on (decreased reliance on soft coal, scrubbers on smokestacks, and the like) served simply to stem the rate of ongoing pollution; existing problems from groundwater contamination, ozone depletion, and acid rain all remain. The rate of deforestation in Africa, South America, and Southeast Asia has stabilized, but isolated instances of slash and burn practices continue, particularly in the legal Amazonia and in Borneo. Climatic changes due to global warming and ozone depletion continue to defy control. The latter is mainly an economic issue, since such developing countries as China refuse to significantly cut either their coal production and consumption or their use of chlorofluorocarbons. In addition to providing assistance in natural disasters (floods, forest fires, etc.), Army forces have now taken on frequent and manpower-intensive operations in environmental protection and cleanup. Assistance is often provided through the UN Environment Programme.

How the Trends Played Out. The seven consensus trends have played out as follows:

- The Soviet Union has taken a very strong inward, antitechnology turn in response to its second major nuclear disaster. The conse-

quences of having two cities virtually sealed up have not been lost on the Soviet leadership.

- Long-simmering ethnic tensions in Europe, Southeast Asia, and Africa have flared as charges and countercharges about the pollution fly back and forth. Conflict has remained relatively constant in frequency but is now fueled, in part, by growing environmental tensions.
- Improvements in sensing technology have been utilized by the burgeoning environmental protection industry. Application of military technology is widespread. Weapons have, indeed, proliferated.
- The application of sensing technologies has put a crimp in drug trafficking, which, although not eradicated, is less of a problem in its own right and less of an influence on terrorism.
- The Americans, Japanese, and the Germans are heavily developing and producing antipollution devices, which has helped their economic position vis-à-vis the developing countries. "Debt for nature" swaps continue to be used as the industrialized world attempts to wean developing countries from reliance on rainforest products, chlorofluorocarbons, soft coal, etc.
- In 1998, Bioenergy International, an American firm, announced it had perfected a genetic procedure that produced ethanol at prices competitive to those for gasoline. By 2003, car companies were well on their way to outfitting (and retrofitting) engines to accept the new fuel. America was on the way to energy sufficiency.
- With the development of a viable energy alternative, the domestic pressures to focus on the quality-of-life issues have grown dramatically. Support for the application of military force to geopolitical problems has dropped.

Summary of Alternative Scenario #3. The primary feature of this world is that the United States now finds its land forces devoting much more assets and time to environmental protection and civil affairs than to combat preparations.

Alternative Scenario #4

This world violates the following assumption: "Our long-range systems will be militarily effective." The main element of change is that there have been significant breakthroughs in weapons technologies that negate the military effectiveness of the existing long-range systems.

Scenario Description. The most significant breakthroughs have been in impulse radars and nonlinear optics. A variety of advanced impulse (and related) radars have largely negated the advantage enjoyed by stealth technologies in the 1990s. In addition, advances in nonlinear optics and free-energy lasers have led to effective beam defenses against both aircraft and missiles. Nonlinear optics have solved many of the focusing problems of lasers in the 1990s, and both medium- and high-powered lasers have been integrated into relatively mobile defenses against aircraft. High-powered lasers have been used effectively against "brilliant" missiles. Advances in free-electron lasers used for generating microwave energy have been field tested in high-powered microwave systems against aircraft and terminally guided missiles. Airborne lasers have passed demonstration tests, and all the relevant technologies are well in hand.

This is a world that has gone defensive. After the Gulf War in 1991, the rush was on to develop and acquire stealth technologies and smart weapons. The inevitable backlash, led by newly emergent economic powers now threatened by unstable states with significant offensive arsenals, came in the second decade of the 21st century.

How the Trends Played Out. The seven consensus trends have played out as follows:

- The Soviet Union is smaller and neither particularly friendly nor belligerent. Its internal focus through much of the 1990s has led to a defensive mindset. Much of its formidable military capability was neglected through the 1990s (relying primarily on quantity in the interim) while the economy was being restructured. Its equally formidable scientific community has been working disproportionately on defensive force multipliers and has made significant breakthroughs in nonlinear optics. As its newly emergent economic power is put to the task of modernizing its military, the Soviet Union concentrates on defenses against the raging offensive systems and tactics that have proved effective in numerous regional conflicts.
- Those regional conflicts have involved readily available first- and second-world weaponry (particularly U.S. weaponry), but generally not the first- and second-world countries themselves. This has led the conflicts to become testing grounds for new offensive weaponry and tactics, further fueling the defensive backlash.
- Terrorism and drug trafficking have diminished as global concerns in the wake of increased regional conflict. This is particularly true

for terrorism. The developed countries have increased general vigilance against terrorism in light of the frequent regional conflicts.

- More important than the Soviet's turn toward defensive weaponry has been the defensive emphasis of some of the newly emergent economic powers, particularly the Japanese. While the United States (with its continuing smaller defense budget) has opted to maintain an emphasis on offensive capability since its 1991 success (and in keeping with its ALB-F doctrine), Japan has turned its technological and (newly emergent) scientific might to the problems of defense technology. The newest defensive systems are easily the match of the most modern offensive systems, and many countries are beginning to rethink their military emphasis in light of the continuing devastation from regional conflict.
- Even oil has played a role in the new defensive orientation. Continuing conflict in Southwest Asia and an oil crisis during the one relatively calm period in that region have made it clear that oil is no longer the fuel of choice for the world. While electric transportation is still slow in catching on, electric production has increased tremendously in the developed world. Nuclear power (in spite of environmental concerns) now accounts for 40 percent of U.S. electricity consumption (up from 20 percent in 1990) and the general demand for oil, both to generate electricity and to fuel cars, is starting to decline. The defensive orientation and the move toward beam-weapon defenses have both been heralded as steps away from dependence on foreign oil.
- Environmental concerns continue (particularly in light of the increase in nuclear power generation and nuclear waste disposal), but massive toxic cleanup efforts (heavily involving the U.S. Army) and serious attention to disposal issues have defused the concerns to some extent.

Summary of Alternative Scenario #4. In this world, the defenses are beginning to dominate the long-range weaponry in actual battle, causing a rethinking of the role of long-range weapons of the now-ancient ALB-F concept.

5. CONCLUDING OBSERVATIONS

Although its main output was the alternative future scenarios, the research reported here also led to several observations about the further application of the assumption-based planning to Army 21, opportunities for refining the methodology itself in future applications, and the revealed robustness of the ALB-F Umbrella Concept.

ASSUMPTION-BASED PLANNING AND THE ARMY 21 PROCESS

In this study, we developed four future scenarios. To the extent that they are plausible, they point to four potential challenges to the ALB-F Umbrella Concept. However, the research reported here does not represent a full application of our assumption-based methodology. As of our writing, the Army DCS for Concepts, Doctrine, and Development had not completed the application of the methodology.

Developing scenarios based on violated assumptions only identifies how and why the ALB-F operational concept might break in 30 years; the scenarios do not suggest how to fix it. This final step, again, requires hard, creative thinking. Many methods exist for taking a set of worlds such as these and coming up with strategies or concepts for dealing with them. It is not at all clear, however, that developing a full-blown operational concept to deal with these four scenarios is the most effective thing to do. The worlds are so diverse that a single concept to cover all four would probably have to be too general to be of much use. The ALB-F Umbrella Concept itself is dealing with a much nearer and more certain world, and some believe it to be too general even so. For this reason, the last step in the methodology is to use these scenarios to help develop hedging and shaping actions and to help identify signposts. These are two defensible uses of the scenarios that would benefit the Army.

By developing hedging and shaping actions, we mean to use these scenarios to think about actions that should be taken immediately to begin preparing for the eventuation of any of these worlds. Not many areas in Army affairs require that much lead time, but one comes immediately to mind—technology investments. Technology investments, particularly at the basic research and exploratory development level, should be guided by potential actions the Army might take to address the challenges posed by the four scenarios.

By signposts, we mean events or trends that would suggest that the world had taken an important turn toward one of the challenges to the ALB-F concept. Identifying such signposts would provide the Army with a set of indicators that the ALB-F concept was coming under challenge, warning the Army to prepare to meet the new challenge. One of the key features in thinking about signposts is the lead time required in identifying an important change to provide the Army sufficient time to prepare for the change.

REFINING THE ASSUMPTION-BASED PLANNING APPROACH

Unlike trend-based approaches, which try to predict the future, assumption-based planning attempts to deal explicitly with uncertainties and so generates a range of plausible futures. Each future represents a significant change from key assumptions underlying today's plans. It is this close connectivity between today's plans and alternative futures that makes it possible to develop hedging and shaping actions and to identify signposts. However, even if these final stages of the methodology are not undertaken, the identification of assumptions remains a useful exercise in itself. The explicit consideration of assumptions enables planners to work within a common, consistent framework.

In the present study, problems and opportunities arose in using the assumption-based methodology that did not appear in 1987. It was more difficult to identify both assumptions (we identified fewer explicit assumptions and more implicit ones) and elements of change that might violate the assumptions. It turned out to be useful to iterate the process of identifying assumptions and elements of change—that is, to use the results of one to try to improve the results of the other. In this case, by using the elements of change, we were able to tease out further implicit assumptions from the umbrella concept.

It was clear in both applications of the methodology that some of the assumptions are more important than others. In other words, there were assumptions whose violation we could posit plausibly on the basis of the elements of change, but whose violation would not seriously affect the umbrella concept. For example, if the Army were not to conduct joint operations, the actual operations would be different, but the precepts of the ALB-F concept would not suffer greatly. However, if the United States were severely overmatched in long-range weapons, the concept would be dealt a serious blow. It may well be useful as a separate exercise to think about the most important assumptions that underlie the object of interest; more generally, it

would be desirable to develop a rudimentary "theory of assumptions" to help guide their discovery and formulation.

There is a philosophical purity and analytic ease in working with a single assumption and a single element of change to generate significantly changed alternative futures. However, it became clear to us that there are instances in which multiples of either might add to the utility of the methodology and the richness of the results. In the present study, we were interested primarily in identifying those assumptions underlying ALB-F that might be violated. Whether they are violated in combination or singly was of lesser importance. Other applications of the methodology might have good reasons to take on the added challenge of dealing with more complexly generated scenarios.

ROBUSTNESS OF THE ALB-F UMBRELLA CONCEPT

It was easier for us to develop alternative future scenarios for FM 100-5 than it has been for the ALB-F Umbrella Concept. We concluded that this was because the ALB-F concept is much more general and encompassing than FM 100-5 had been. This should not be too surprising. The Cold (but thawing) War world of 1987 was much more stable in its outlook with respect to the major threat to U.S. security. In addition, as doctrine, FM 100-5 was much more specific about operations than is ALB-F, which is an umbrella concept; ALB-F is more at the level of TRADOC Pamphlet 525-5 (1981). The greater generality of ALB-F is thus due both to its status as an umbrella concept and the requirement that it address a more complicated world.

The fact that ALB-F is more difficult to violate implies that its generality makes it more "robust" than FM 100-5. However, the increased difficulty also implies that doctrine writers will be challenged to develop ALB-F into something that is compelling as a guide to force structure development, training, etc. In the inevitable tension between breadth and specificity, recent world changes have forced ALB-F to be broader in its coverage of uncertainty and less useful as an instrument for driving the CBRS.

A clear reflection of this tension is found in the requirement for the ALB-F Umbrella Concept to cover the entire operational continuum and the concentration in the current version on combat operations. The argument that all noncombat operations are "lesser included cases" of the combat operational concept is tougher to establish when noncombat operations are more on a par with the most stressing potential combat situations. The ALB-F Umbrella Concept appears in-

complete in the area of nonconflict situations, and it is not clear that the "fix" is easy. It may be that the ALB-F umbrella cannot be extended sufficiently to cover nonconflict situations, and that other umbrellas are needed.

Appendix A

TESTING THE HYPOTHESIS UNDERLYING THE ASSUMPTION-BASED METHODOLOGY

We have taken two basic approaches to testing the central premise underlying our assumption-based methodology (that an operational concept will change in response to changes in the assumptions upon which it is founded). First, before we actually used the methodology in 1987, we ran some thought experiments to check the philosophical evidence for the methodology. A second and unplanned test was made possible after we had initially used the methodology in 1987, when world events moved quickly to violate a major assumption underlying the Army's AirLand Battle doctrine. At that point we were able to observe whether the doctrine would change in response.

THOUGHT EXPERIMENTS

We recognized that our fundamental hypothesis is not the only, nor necessarily even an obvious, agent for change in the Army operational concept. Since the methodology depends so heavily on this hypothesis, we took some pains to convince ourselves of its plausibility. Specifically, we tried to answer two questions about the hypothesis:

- Is there historical evidence that an Army operational concept has changed because its underlying assumptions changed?
- Does this approach help us distinguish between worlds that will require changes in the Army's operational concept and others that will not?

For historical evidence, we turned to a TRADOC history of developments in Army doctrine between 1973 and 1982¹ and found evidence of a change in Army doctrine that was due at least in part to a change in its underlying assumptions. In the monograph, Romjue traces the change in Army doctrine from "Active Defense" (published as FM 100-5 in 1976) to "AirLand Battle" (FM 100-5, published in 1982). He begins by citing several criticisms about "Active Defense" doctrine

¹John L. Romjue, *From Active Defense to AirLand Battle: The Development of Army Doctrine 1973-1982*, TRADOC Historical Monograph Series; Historical Office, United States Army Training and Doctrine Command; Fort Monroe, Virginia; June 1984.

that surfaced after its publication, ranging from its defensive emphasis to the "first battle" orientation, emphasis on firepower, abandonment of traditional tactical reserve ratios, and dependence on lateral movement to achieve concentration. Active Defense was not without its supporters on these issues, but regardless of one's views, these complaints revolved mainly around whether or not Active Defense was the best doctrine for the given situation—fighting a high-intensity war against the Soviets in Europe.

There was one other criticism, however, of which the author says:

[I]f the doctrine of 1976 was to prove vulnerable on any point, it was one based on a scenario that may already have ceased to be realistic by 1976: the classic massed armor breakthrough as the assumed Soviet operational maneuver.²

By 1976 "a major shift in tactical operational concepts"³ had occurred and one could see in Soviet exercises

another operational maneuver—the concept of multi-pronged attacks by BMP regiments reinforced with armor across the entire battlefield seeking holes and weakspots. In training, the Soviets were spending quadruple the time practicing the multi-prong attacks and meeting engagements as they were rehearsing conventional frontal breakthroughs.⁴

Of this new Soviet operational maneuver—meeting engagement followed by flexible response—one observer wrote at the time:

Severe ramifications fall from FM 100-5 having built its edifice on but one of the possible Soviet operational maneuvers.⁵

Here, then, was what we were looking for. One of the assumptions underlying FM 100-5 and the how-to-fight manuals of the late 1970s was that the Soviets would mass for a breakthrough, allowing the United States and its allies to concentrate their forces. When it became clear that the Soviets were seriously practicing tactics that violated that assumption, there was pressure to change the doctrine. *How* it should change was a matter of much subsequent debate. Our interest here is that what led, at least in part, to the change was the

²Op. cit., p. 16.

³Quoted from Philip Karber in op. cit., p. 16.

⁴Op. cit., p. 16.

⁵Op. cit., p. 16.

invalidation of one of the doctrine's underlying assumptions about enemy tactics.

Before leaving this point, it is worth reemphasizing that there are, obviously, a number of contributing factors leading to any change in doctrine. In choosing to concentrate only on changes in the assumptions underlying the doctrine, we are ignoring other, perhaps equally important factors. Nonetheless, if the assumptions underlying a doctrine change, the doctrine itself is likely to have to change, and monitoring the assumptions is *one* way of monitoring the potential for change in the doctrine. Further, changes in the assumptions are the aspects of that doctrine that are generally most closely tied with *slowly changing* factors. These are such factors as who the enemy is, how it will fight, where the war is most likely to be, etc., that do not change much in the short term but that can change over a period of 30 years and that are likely to have a dramatic effect on doctrine when they do.

As evidence of the discriminatory utility of the methodology (the response to the second question above), we ran the following thought experiment: Can one devise future worlds that are roughly plausible and in which (1) the world changes in dramatic ways but Army doctrine and assumptions still "fit" and (2) the world changes in a relatively small but important way that causes an underlying assumption to change and that causes a complete reevaluation of Army doctrine? If we could come up with examples of each, it would suggest that concentrating on the assumptions is a useful way of distinguishing between changes in the world that would and would not affect Army doctrine. The examples we came up with are contained in the following two thought experiments.

In the first case, without explaining how the world changed, consider the following world in 2018: The United States' major alliances are with countries on the Pacific rim (China, Japan, South Korea, the Philippines, etc.). NATO and Southwest Asia are of significantly less concern to the United States. Its major troop and materiel deployments are on the Sino-Soviet and North Korea-South Korea borders. The Soviet Union is the primary threat to peace in the free world, and there is still general agreement that the United States must be wary of the Soviet bear. The world's arsenals and force structures are similar to those in 1990—there are plenty of anti-tank missiles, but there are also plenty of tanks with reactive armor and anti-tank missile defenses. Weapons are generally smarter, but so are the defenses. Nuclear weapons are a reduced threat but not absent in the theater. And so forth. In other words, there have been *some* dramatic changes

in the world. (The rough plausibility of this world can be argued primarily from noting that most of the fastest growing economies are in the Pacific Rim area and that the economic "center of gravity" appears to be shifting to that area of the world. Japan, has passed all but the United States in Gross National Product, and the economies of South Korea, Singapore, and even China are expanding much faster than those in other parts of the world. At this point, both the continued belligerence of the Soviet Union and the continued division of the Korean Peninsula are the more problematic aspects of this thought experiment, but it should be thought of in terms of the world to which the 1982 version of AirLand Battle was addressed.)

On the other hand, the overall effect on *AirLand Battle doctrine* would be very little, because these *particular* changes in the world do not (at first blush) seem to materially affect the way the Army describes preparing for a mid- to high-intensity conflict in the 1982 version of FM 100-5. This, then, is a case in which the world could change rather dramatically, yet the stress on 1982 Army doctrine would be relatively minor.

The second case is a world much like that of 1987 with one important exception: The Army is not heavily forward deployed either in Europe or in Korea. (In thinking about this in 1987, the dramatic changes had not taken place in Eastern Europe. At that point, there were a variety of scenarios involving withdrawal of troops from Europe, including a diminution of the Soviet threat, budgetary problems in maintaining such a large forward presence, and actually being invited out by the Europeans.) This could have been a small change in the world in that it could have been effected by a single unilateral act by the President of the United States. It is not a small change in many other senses, including its implications for Army doctrine related to mid- to high-intensity conflict. Much of the 1982 version of AirLand Battle doctrine in FM 100-5 was formulated around concerns about a mid- to high-intensity conflict in Europe, with the Army heavily forward deployed.⁶

These mental exercises reassured us before applying the methodology in 1987 that an approach based on the assumptions underlying the Army operational concept was sound.

⁶TRADOC Pamphlet 525-5, "Military Operations: Operational Concepts for the AirLand Battle and Corps Operations—1986," 25 March 1981; Herbert, Major Paul H., *Deciding What Has to Be Done: General William E. DePuy and the 1976 Edition of FM 100-5, Operations*, Leavenworth Paper #16, Combat Studies Institute, Fort Leavenworth, Kansas, p. 106.

A REAL-WORLD TEST OF THE METHODOLOGY

Our objective in 1987 was to present evidence several worlds were possible in 30 years that would stress the Army's AirLand Battle concept as codified in AirLand Battle Doctrine (FM 100-5). We used the methodology to generate four alternative worlds that violated the assumptions underlying FM 100-5. Two of the four violated the implicit assumption that the Army would be forward deployed in strength. The one that is most interesting in light of events since 1987 is the following world, as we drew it then.

In this world, the violation is to the implied assumption "the Army is forward deployed in strength." In this world, relations between the United States and the Soviet Union are improved somewhat. The Soviet Union has become more defensive militarily; there have been significant, enduring reductions in theater nuclear arms; and the Soviets have unilaterally withdrawn a substantial number of their forces east of the Ural mountains. One of the most significant outfalls of this behavior has been a significant easing of tension between the Federal Republic of Germany and the German Democratic Republic.

In West Germany, the public mood has been very much against having U.S. soldiers forward deployed in strength. The primary argument comes from the original intent in having a significant deployment of U.S. troops as a counterbalance to the deployment of tactical nuclear weapons. With the substantial disappearance of tactical nuclear forces, the rationale for keeping substantial U.S. troops on German soil has disappeared, and the U.S. troops are eventually "invited" out. In the bitter compromise that is eventually hammered out, VII Corps is sent home, while V Corps remains but is widely viewed as being little more than a glorified trip wire.

Eight major trends⁷ have played out as follows in this world:

1. *Continuing depletion of oil and other strategic materials.* Energy concerns do not play a big role in military relations in this world. Dwindling sources of natural resources—particularly oil—are worrisome, but while those worries have waxed and waned in the intervening years, they have done little but keep tensions high in the oil-producing regions of the world.
2. *Increased commercial and military space activity.* Cooperation on a Mars mission has helped reduce the general tensions between the Soviet Union and the United States and has generally been credited with helping to keep space a sanctuary. There are more military assets in space than ever before, but they are oriented almost exclusively toward surveillance and communication.

⁷These trends were identified by a variety of futures sources in 1987.

3. *Proliferation of sophisticated conventional weapons.* Sophisticated conventional weapons have indeed proliferated in the world and have turned several of the more economically successful countries into formidable military presences. These conventional weapons are not without countermeasures, but such countermeasures are generally expensive, and only the superpowers are equipped to defend against these modern armies.

4. *Proliferation of nuclear and chemical weapons.* Chemical weapons have not proliferated. Treaties and general public discomfort with these weapons have kept them under control. Nuclear weapons have proliferated, however, and some 20 states are thought to be nuclear capable (although several are not known to have "weaponized" their putative capabilities). The offensive value of nuclear weapons has been generally discounted, and, while reasons for having a nuclear capability differ, countries generally have them to be thought of as technically advanced and militarily and politically resolute.

5. *Multipolar economic world.* The Japanese economy has long since been the second largest in the world and is now creeping close to that of the United States. Several countries are creeping close to the Soviet Union. This economic challenge to the Soviets is widely thought to be responsible for their current orientation toward economic matters and away from the military.

6. *Global economic shift to the Pacific.* The economic shift to the Pacific has also heightened Soviet fears that they are oriented toward the wrong military threat.

7. *Soviet Union the main U.S. adversary.* The Soviet Union remains the major threat to peace in the western world. No one doubts that they could remobilize for a European invasion from east of the Urals in a matter of days. Nor do they appear particularly docile, as their large standing Army and extensive operational training demonstrate.

8. *Increase in low-intensity conflict.* Low-intensity conflict remains at levels similar to those in the late 1980s. Because of the proliferation of sophisticated conventional weapons, the conflicts tend to be more destructive.

In this world, the predominant worry remains war in Europe, but the United States does not have a large, forward-deployed presence. West Germany's growing nuclear phobia, Gorbachev's continuing unilateral "peace" initiatives, and Chancellor Kohl's current press for Tactical Nuclear Force talks all lend credence to a trend in this direction. This world presents U.S. operational planners with a situation like World War II. The world is less threatening, but if there is a mid- to high-intensity conflict, strategic lift will be the primary concern, and the Army will not be heavily involved in the first battle. Among the problems the Army will face in this world is the serious problem of its vision as an institution and its corresponding doctrine.

Whatever prescience this world description may have today, it was the plausibility of such a world in 1987 that lent credence to the possibility that the Army doctrine of 1982 might have to change. Events in the intervening four years have brought about a slightly different world than that argued for in the scenario, but the essential feature of our scenario—that the Army would no longer be heavily forward deployed in Europe—is evident, violating a key assumption of Army doctrine. And Army doctrine changed to account for the fact that the United States will not be heavily forward deployed for the foreseeable future. This demonstrated responsiveness to a violated assumption argues for the soundness of our assumption-based approach.

Appendix B

INVARIANCE CHECK ON ELEMENT-OF-CHANGE CATEGORIES

In looking out 25 to 30 years, the Delphi is examining what may well be a largely unknowable world. In asking questions about that world, respondents were asking about the world in general and how its state might affect the Army and its operational concept. In that sense, they were getting at invariants in the world that relate to the Army's operational context (i.e., principles of the operational environment akin to "principles of war"). Put another way, the respondents' questions implicitly assumed that the framework within which they understood the world would remain basically unchanged in the future. To the extent that the framework proved to be invariant, the future could be said to be knowable, even if not predictable. We were, of course, interested in finding a way to test the invariance of the categories by which we had organized the elements of change identified by the respondents.

The dramatic world changes that took place between the time we ran our first Delphi in 1987 and our second in 1990 afforded us an unexpected opportunity to check the possibility that the respondents were identifying invariant categories. By looking at the questions asked in this particular Delphi from both 1987 and 1990, we could determine whether the categories changed with the changes in the world (implying variance) or proved largely insensitive to the dramatic change (implying invariance). To facilitate the comparison, we duplicated in 1990, as closely as possible, the Delphi we ran in 1987. We presented the participants with the same fictional situation, resurveyed as many of the original participants as possible, and used the same three-round format.

Table B.1 summarizes that comparison. Keeping in mind the number of participants in each round (13 in 1987; 14 in 1990), there is a striking similarity in the *relative* number of participants focusing on each category between the two experiments. Questions relating to international factors received the most attention, followed by those concerning the threat, military issues, domestic concerns, and technology. This suggests that the element-of-change categories are relatively impervious to geopolitical changes, such as those witnessed over the previous three years. Secondly, the relative importance

Table B.1
**Number of Respondents by Element-of-
 Change Categories**
(round three)

	1987	1990
International		
Economics	8	7
Arms control	6	1
Alliances	10	10
UN	0	3
Global military force levels	1	2
Superpowers	2	3
Soviet Union	1	2
Regional	2	3
Ideology	3	4
Other	4	3
Subtotal	37	38
Threat		
Terrorism	6	5
LIC	1	1
New hegemony	2	3
Domestic/border	3	2
What's the threat?	1	8
Weapons proliferation	2	2
Nuclear, biological, and chemical weapon use	3	2
Subtotal	18	23
Military		
Army size and capability	8	7
Service structure	2	6
Force deployments	6	4
Combat experience	0	9
Subtotal	16	26
Domestic		
National will	4	1
Value of military force	5	3
Defense budget	0	4
"Policeman"	0	4
Importation of raw materials	1	4
Environment		3
Other	2	3
Subtotal	12	22
Technology	11	8
Subtotal	11	8

accorded the various elements of change suggests that those that are relatively easy to extrapolate were of relatively less concern (perhaps because they can be extrapolated). It is true, however, that the sub-

stantive thrust of many of the questions changed during the intervening period, a result perhaps expected, given the geopolitical developments during the previous three years.

For example, in 1987, questions concerning the threat had a focus that is dramatically lacking in 1990. This is captured most succinctly in the 1990 question category, "What's the threat?" Although virtually nonexistent as a concern in 1987, almost every respondent in 1990 was trying to get information on the threat in the absence of a strongly held hypothesis about either the nature, location, or scope of the threat potentially facing the United States. In other words, many of the questions about the threat posed by the respondents in 1990 took the form of "Is there *any* nation with a military force that could be considered as a threat?" whereas in 1987 they were of the form "Is low-intensity conflict (terrorism; nuclear, biological, and chemical use; etc.) still the threat?" The end of the Cold War has certainly undermined confident identification of national security threats. With the demise of "the threat," the search for "a threat" is clearly on.

That theme continues into several of the other question clusters, most notably the quest for information about combat experience and global military force levels. Neither of those issues was in strong evidence in 1987. Regarding combat experience, it is worth recalling that the fictional situation posed for the Delphi explicitly stated there had been no major war during the 30-year sleep. Evidently, that was sufficient to reassure the 1987 participants that conflict involving the United States had not occurred, whereas that was not so in 1990.

But the differences we note seem mostly to be differences in emphasis, not substance. For example, in 1987, respondents focused on Army capabilities; in 1990, there was a strong tilt toward questions dealing with Army size, roles, and missions (particularly noncombat, nontraditional roles and missions). In 1987, respondents raising questions about the economy focused on global distribution of wealth; in 1990, the theme of American competitiveness is dominant.

In the main, the invariance seems to hold. Take the case of terrorism. About the same proportion of people identified terrorism as a concern and even phrased their questions in much the same way. In 1987, participants asked whether terrorism was the most common threat; in 1990, they asked whether it was a major concern.

Questions about force deployments also received proportionally close to the same attention, and a similar sense was conveyed. But there is one interesting point to make, perhaps less a distinction than a minor difference. In 1987, many of the questions asked about specific loca-

tions. In 1990, the questions were directed toward size rather than location.

The category of alliances is even clearer. In both Delphis, the nature of the questions was quite general (who, what kind, NATO). But an interesting addition in 1990 is the presence of questions relating to whether alliances require the presence of military forces or bring the United States close to a ground threat.

Technology is also clearly invariant as an element of change. Many respondents made the point that technology always affects doctrine and hence concepts. The threat of nuclear weapons, as one respondent put it, encouraged concepts and doctrine that emphasize dispersal and decentralized operations. Should something equally significant develop (space-based particle weapons; the ability to engage in conflict without the use of close-in battle forces; or substantial breakthroughs in propulsion, transportation, or projectile weapons), the effect on both concepts and doctrine would be both immediate and potentially profound.

In sum, virtually all of the element-of-change categories persisted over time. This persistence implies that trends concerning economics, alliances, global military force levels, regional developments, and superpowers will be important for planners to track over time.

Of the categories that showed changes between the two experiments, none is more dramatic or telling than those dealing with the threat. Confidence about the nature of the threat has virtually vanished: More than three-quarters of the respondents in the 1990 Delphi pointedly asked *what* the threat was. This is obviously an issue that will need careful watching.

Linked to this issue are questions about combat experience. Any American involvement in combat will clearly affect future doctrinal development and ought to be monitored closely.

In the realm of military issues, Army size, capabilities, and force deployments seem to be the ones to watch. Capabilities and deployments seem to be particularly important.

In the area of domestic issues, tracking resource imports is likely to be increasingly important over time. Although direct questions about national will and the value of military force were down in 1990 from 1987, the 1990 questions included a number on the defense budget, the "policeman" concept, and the environment. If you total those categories, questions relating to will and value may well have increased in the second experiment. In any event, it is clear that domestic sup-

port for the military will certainly affect resourcing and therefore doctrine. It appears to be an additional invariant element of change.

If one focuses on the aspects of our changed world that are causing the Army to alter its operational concept, the questions in the two Delphis are interesting in several respects. A number of questions in the 1987 Delphi had to do with whether the United States is in conflict with another superpower, whether there had been serious changes in East-West competition, whether the nuclear arsenals had been significantly altered, whether there had been fundamental changes in the composition or character of U.S. alliances, and whether the United States had significant deployments on foreign soil. Events in Eastern Europe have produced *yes* answers to all of these questions. In that sense, then, the 1987 Delphi pointed not to the events that would occur, but to the changes from these events that—if they did occur (for whatever reason)—would lead to changes in Army doctrine and concepts.

Another interesting aspect is that many of these same questions show up in the 1990 Delphi. This suggests that, were further changes to occur in these areas (for whatever reasons), there would again need to be changes in Army doctrine and concepts. Such questions point to areas of enduring concern for doctrine and concepts and are independent of the specific events that bring about the change.

The final aspect of interest is in the one concern that has virtually disappeared between the two experiments—nuclear arms control. Questions in that area in 1987 were specifically aimed at what was happening to the nuclear threat, and it was generally conceded that arms control was the only mechanism for bringing about change in this area. The events that have brought about changes in the nuclear arsenals have included arms control, but circumstances having changed (for whatever reasons), the concern about the mechanism for change (arms control) is no longer apt and has, rightly, disappeared.

In summary, having compared two Delphis separated by a period that witnessed great world change, we found that the element-of-change categories and their relative rankings remained invariant, even though the elements of change themselves did not. This persistence of categories argues that the world is indeed knowable to some extent, even in the face of the kind of radical change in basic assumptions that can be expected to occur in the course of 25 to 30 years, and that trying to see into that future is a useful exercise.

Appendix C

DELPHI QUESTIONS FROM ROUND 3 OF 1987 AND 1990

Below, by category, are all the questions the participants asked in the third rounds of both the 1987 and 1990 Delphis. Because the Delphi process is in part about building consensus, some respondents adopted or adapted questions as the rounds proceeded that had originally been asked by others. Sometimes, more than one respondent asked the same question (i.e., verbatim or near-verbatim). Rather than repeat such questions in this list, we indicate in brackets how many times it was asked.

The total number of questions in each category cluster shown below is quite different from the totals shown in Table 4.1, because the table counts *people* per category of question, not questions per person. As was explained in the text, doing otherwise could have skewed the analysis because of both the relatively small sample size and the presence of several "one issue" respondents. For example, in 1987, nine of the questions in the category "Army size and capability" were from two respondents, and five of the questions in the category "economics" were from one respondent.

INTERNATIONAL

Soviet Union

- 1987** Is the Soviet Union still considered a threat to U.S. interests?
- 1990** Do the people of the territory controlled by Moscow vote regularly in meaningful elections?
- Has the Soviet Union devolved into sovereign republics?

Regional

- 1987** Has the Arab-Israeli conflict been essentially settled (i.e., no more hostility than between the U.S. and Soviet Union in 1984)?

Has there been major instability in Mexico in the last 30 years?

1990 Is the Mexican army larger (in terms of total active duty personnel) than the U.S. Army?

Have the Koreans reconciled/reunited?

Have population and/or economic pressures eased in Mexico?

Has the PRC [People's Republic of China] democratized?

Has the Palestinian issue moved any closer to resolution?

Has the European Community become a major player in world events—economically, politically, militarily? [2]

Have the nations of the Arab world united?

Economics

1987 Has there been a major depression (i.e., not as great as 1930s, but greater than anything else since the 1930s) anywhere in the world?

Has there been a major depression or failure of international economic institutions?

Is the U.S.'s percentage of World Gross Product less than 25 percent?

Does the socialist mode of production still prevail in the USSR? [2]

Do free market economic ideas have greater currency than 30 years ago?

Has Asia maintained the higher rate of economic growth than other regions of the world?

Has the relative economic position of the U.S. with respect to the rest of the world substantially altered?

Is there a significant have and have not grouping among nations?

- 1990** Is the U.S. still economically a superpower?
- Is the U.S. GNP among the world's five largest? [2]
- Has the uncontrolled budget deficit eliminated the U.S. from the ranks of the "world powers?"
- To what degree has the U.S. economy become interlinked with regional and/or global economies?
- Has the real per capita GNP of the U.S. continued to grow at the rate of the 1970s and 1980s?
- Are there still quite a few have not nations?

Arms Control

- 1987** Has there been an arms control agreement leading to a reduction of nuclear warheads of 50 percent or more on each side?
- Have the U.S. and the Soviet Union agreed upon nuclear weapons disarmament?
- Has the nuclear arsenal of the East and West been significantly altered?
- Has Arms Control or specific weapons advance eliminated the threat of nuclear weapons?
- Have the rules of land warfare (e.g., Geneva Convention) changed to effectively restrict/eliminate the use of "weapons of mass destruction" in the last 30 years?
- Has significant nuclear disarmament happened?
- 1990** Have the CFE talks resulted in a set of viable worldwide agreements that limit the amount of forces fielded and the type weapons systems deployed?

Ideology

1987 Given that we have coexisted peacefully with the Soviets and there has been no war fought in Europe for over seventy years, do our military planners now feel (and do our plans and capabilities reflect) that any potential conflict in which we are likely to become involved would be as a result of economic, ideological or population pressures elsewhere in the world and not involve a direct U.S./Soviet confrontation?

Is the U.S. a superpower with economic or ideological interests which are in conflict with another superpower (not necessarily the USSR or PRC [People's Republic of China])? [4]

In the past 30 years, have there been any important, fundamental (e.g., discontinuous, not obviously extrapolatable) changes in the international structures of power, ideology and wealth?

Has the proportion of states hostile to the West increased?

Have there been fundamental changes in tension between nations/regions in the north-south or developed-underdeveloped arena?

Is there a significant have and have not grouping among nations?

Have there been fundamental changes in East-West competition?

1990 Has the world become more polarized, along any single axis, than it was 30 years ago?

Has the world become a highly competitive multipolar world with conflicts beyond friendly economic competition?

Has Islam receded as a political force?

Are there groups of nations that have allied with each other that are competitive with other groups of nations?

Superpowers

- 1987** Are the U.S. and the USSR still the only superpowers?
- Are the U.S. and the USSR still the major superpowers, and how has their relationship changed?
- 1990** Is America still a superpower?
- Is the U.S. still among the great powers?
- Are there superpowers other than the U.S. or USSR in today's [2017] world?

Alliances

- 1987** Do we still participate in basically the same set of alliances as we did in 1988 and do we still differ ideologically and conflict economically with other global superpowers?
- Do we and our adversaries still consist primarily of the same set of alliances (e.g., NATO and WP) as we did in 1988? [2]
- Does NATO or some new form of friendly alliance still exist as an entity that functions at least as well as it did 30 years ago?
- In the past 30 years, have there been any important, fundamental (e.g., discontinuous, not obviously extrapolatable) changes in the composition or character of alliances involving the United States or its principal adversaries?
- In the past 30 years, have there been any important, fundamental (e.g., discontinuous, not obviously extrapolatable) changes in the military or economic commitments of the United States to other nations?
- Are there other economic/political relationships that we or our allies (1988) have entered into that changed our national interest?
- Are we allied with a greater proportion of nations than in 1988?

Does NATO still exist?

Have there been significant alterations in the U.S. alliance/coalition arrangements?

Is there a major alliance between Western nations (NATO) and does it still exist in the same manner, balance?

Have we entered into new/stronger economic, political or military relationships with other countries that changed our national interests?

1990 Does the U.S. have any international agreements that require a U.S. military force present?

Are there military alliances (can include political and economic component) that the U.S. is part of? [3]

Are there military (can include but not be limited to political/economic) alliances that the U.S. is part of?

Does the U.S. have any international agreements that require a U.S. military force present?

Is the U.S. a member of any military alliances? [2]

Has the U.S. and Soviet Union entered into any formal agreements establishing a military alliance?

Is our system of alliances and treaties still intact? [2]

Is there an exclusively European security alliance?

Is the U.S. a member of any international alliances that bring us close to a ground threat to that alliance? [2]

Is the U.S. a member of NATO or other European collective security alliance?

UN

1990 Has the United Nations become a cohesive body with sufficient military clout to enforce sanctions? [2]

Is the UN more viable than today [1987]?

Global Military Force Levels

1987 Are military capabilities relatively the same—country to country?

1990 Is the level of military forces in the world significantly lower (as measured by the number of people in uniform) than it was in 1990? [2]

Other

1987 Has there been a major famine (e.g., Ethiopia for most of the African continent) anywhere in the world?

Are the western nations a demographic minority?

Has the sphere of political liberalism expanded in the last 30 years?

Are Western Europe and Japan less dependent on Persian Gulf oil than 30 years ago?

Are the probabilities and risks associated with the conditional bookends of the conflict spectrum—war with the SU [USSR] and reactions to terrorist acts—the same as they were in 1987?

In the past 30 years have there been any important, fundamental (e.g., discontinuous, not obviously extrapolatable) changes in the international structures of power, ideology, wealth?

1990 Has the world become a competitive multipolar world with conflicts beyond friendly competition?

Have any other [energy] sources replaced oil as the major source of energy?

Is there an oil shortage?

Does the international political system operate with respect to regional groups or traditional nation-states?

Has the propensity to solve disputes by force increased or decreased and by how much?

Is the trend toward military conflict as part of the fabric of our world any better (less of a trend) than it was when I fell asleep?

Is there a significant shortage of basic survival capability (like enough food for all the people) in some countries?

THREAT

Weapons Proliferation

1987 Has nuclear weapon proliferation become a significant threat to world or regional stability? [2]

1990 Have nuclear weapons and ballistic missiles proliferated throughout the "Third World?"

Have nuclear, chemical and biological weapons proliferated beyond the great powers?

Domestic/Border

1987 Is Mexico considered a threat to United States interests by 25 percent or more of the U.S. population?

Is the Army deployed along our land borders in order to protect us from illegal entries or military incursions?

Is there internal strife in the U.S. which brings the validity or the ability of the government under question?

Is it more probable that, if the U.S. is involved in land combat, this combat will be on its own rather than another nation's soil?

1990 Have U.S. troops been committed to any significant domestic insurrection (i.e., casualties exceeding 100) during the past 30 years?

Have American [U.S.] troops been involved in meeting a domestic insurrection of any kind in the last 30 years?

Has there been the threat of war or has a war been fought on the U.S. mainland in the last 30 years?

Nuclear, Chemical, and Biological Weapons

1987 Are chemical and/or biological weapons likely to be employed by our adversaries, and have CW/BW been used by our adversaries in the past 30 years despite treaties?

Have nuclear/chemical weapons been exploded/employed by any superpower?

Have nuclear weapons been used, is the strategy of mutual deterrence still in effect, or have the nuclear powers managed to attain disarmament?

1990 Have nuclear weapons been exploded anywhere, by anyone, during the past 30 years?

Has any terrorist organizations used nuclear weapons?

Terrorism

1987 Is terrorism the most common threat faced by the U.S., and do we use the Army to help combat it?

In the past 30 years, have there been any important, fundamental (e.g., discontinuous, not obviously extrapolatable) changes in the composition or character of sub-national or factional (e.g., terrorist) threats confronting the United States and its allies?

Is state or institutional (i.e., Islamic Revolution) terrorism frequently used against the U.S.?

Has terrorism continued to be the weapon of choice against the U.S.?

Is terrorism still a force used against U.S., is it still frequently used, and have we found a way to counter it effectively?

1990 Is terrorism still a major concern and an issue for U.S. policy? [4]

Does state sponsored terrorism exist as we know it today [1990]?

LIC

1987 Given that there has [sic] not been any major wars in the intervening 30 years, have there been any little wars, or low intensity conflicts which have shown Army doctrine to be wanting?

1990 Has low-level conflict (to include both unconventional warfare and small regionally-based conflicts) continued?

New Hegemony

1987 In the past 30 years, have there been any important, fundamental (e.g., discontinuous, not obviously extrapolatable) changes in the composition or character of national or coalition threats confronting the United States and its allies?

Has any significant new military power center emerged (Brazil, militarized Japan, reunited Germany)?

1990 Does any one nation dominate the Middle East?

Has Germany (or Japan) surfaced as a major military power? [2]

Does India retain hegemonic designs in South Asia?

What's the Threat

1987 Have any of the major areas of unrest in the world of 1988 been resolved, changed, or new areas of conflict emerged?

1990 Is there any nation with a military force that could be construed as a threat to U.S. or our national policy? [5]

Is there any nation with a military force that is considered a threat to America or our national policy?

What national security threat(s) does the U.S. face?

Is the major threat to U.S. security one that differs substantially in size and geographic location from the Warsaw Pact threat of 1988?

MILITARY

Army Size and Capability

1987 Has U.S. Army manpower been reduced by 25 percent or more compared to 1988?

In 1987 we did not possess the ability through timely intelligence and rapid lift capability to deploy sufficient forces to an area of potential conflict rapidly enough to deter aggression or ensure we'd win. Are we now no longer constrained by insufficient intelligence and insufficient transportation capability to deter our adversaries?

Is the Army designed to fight a large war and a small war (one-and-a-half wars)?

Has timely transportation of men and material to any area of potential conflict ceased to be a constraining factor? [3]

Have the functional and operational structures of the Army been substantially altered?

Is the demographic make-up (including education, technical skills, sex, race, draftee or volunteer, as well as the total quantity of personnel) of the Army significantly different from 30 years ago?

Have we been training our personnel to be representatives of our ideology around the world for the last 30 years, and are we in a position to exploit our ideologies when combating soldiers of an oppressed nation?

Are the proportions of the Army active, reserve, and national guard components about the same as they were 30 years ago?

Is the Army's mission and doctrine in balance with national military strategy (e.g., does adequate strategic lift exist)?

Is the Army equipped and manned to support its mission and doctrine?

Does our national intelligence gathering capability allow us to obtain complete and pertinent intelligence about our adversaries' weapons and intentions?

Are the doctrine's tenets linked to the principles of war?

How has the Army evolved over this period of time? Is it still a volunteer force, is it still forward deployed?

Are women now allowed to participate in combat?

Will our soldiers be required to fight in relatively unusual environments (such as the Antarctic, Himalayas, underground or in outer space), or with unique weapons (such as advanced robotics)?

1990 Does the U.S. still require a capability for substantial force projection worldwide?

Is the active component of the U.S. Army greater than 200,000 people?

Does the Army have to reach faraway places with large forces? [2]

Is the present size of the Army's active component 500,000 or less?

Is the size of the Army significantly different than it was in 1990?

Does the Army have to reach faraway places rapidly?

Service Structure

1987 Have the separate branches of the services been consolidated into a joint service or does the Army serve under regional joint commanders in all areas of potential conflict?

Have there been significant changes in the roles of OSD, JCS or Services in policy formulation, operational matters and support responsibility?

Have the functional and operational structures of the Army been substantially altered?

1990 Are there still "services" in the U.S. military structure? That is, has the "joint task force" idea of 1990 basically taken over? [3]

Does the American military establishment revolve around a joint organization, or do the services remain essentially autonomous?

Are there still services in the U.S. military structure?

Are there still services in the U.S. military structure? That is, has the U.S. Military become more joint, purple-suited, and cooperative?

Force Deployments

1987 Are there more than 50,000 U.S. Army troops in what is (in 1988) NATO Europe? [2]

Do we have large military presence commitments anywhere around the world (large meaning more than a division-sized presence, or a total overseas commitment in excess of 150,000)?

Are there more than 10,000 U.S. Army troops in any country outside of current (1988) NATO countries, where there were fewer than 100 in 1988?

Are there more than 5,000 U.S. Army troops in Korea?

Are major U.S. forces still forward deployed in Europe?

Are major U.S. forces still forward deployed in the Pacific?

Does the U.S. Army have military force in excess of 250,000 men stationed overseas?

Are U.S. forces deployed in the territories of any allied nation to help ensure their security?

Are U.S. forces occupying the territories of any potential adversary to protect national security or other interests?

1990 Has the American Army been deployed forward in significant fractions (i.e., more than 15 or 20 percent) on average over the last 30 years?

Does the U.S. have more than 30,000 combat personnel (not including Navy aboard ships) stationed overseas in peacetime in any one country?

Has the U.S. been involved in other Iraq-like incidents where a large number of ground forces are deployed to foreign soils? [2]

Combat Experience

1990 Has America been involved in a major conventional war in the last 30 years?

Has the American Army been committed into combat in more than brigade strength at any time in the last 30 years?

Has Army combat experience, if any, in the last 30 years demonstrated that one or a few of the combat arms (armor, artillery, infantry, special forces, airborne, etc.) were significantly more effective or important than others?

Has Army combat experience, if any, in the last 30 years involved significant use of artillery (including rockets and missiles)?

Have more than 100 U.S. troops been killed in any single combat (a war, not a battle) with a foreign nation?

Have more than 100 U.S. troops been killed in meeting any single insurrection?

Since 2005, has the U.S. engaged in combat operations in which it suffered > 1000 casualties?

Has the U.S. responded to overseas contingencies with military forces in the past three years?

Has Army combat experience, if any, in the last 30 years involved significant use of armor?

Is America in an active conflict now?

Has America been involved in a major conflict in the past 10 years?

Has America been involved in a major conventional war in the last 30 years?

Have there been any shooting wars in the last 5 years?

DOMESTIC

National Will

1987 Is the U.S. more willing to employ its military capabilities to further our national objectives when not directly threatened militarily than was the case in 1988?

In the past 30 years, have there been any important, fundamental (e.g., discontinuous, not obviously extrapolatable) changes in the political will of the United States to employ military forces in pursuit of its international commitments and foreign policy objectives?

Is the American public less willing to be involved in foreign alliances and support a high level of defense spending?

Have there been any significant shifts in U.S. domestic attitudes toward the use or value of military power?

1990 Is the national will strongly behind the U.S. foreign policy?

Value of Military Force

1987 Have there been any significantly adverse shifts in U.S. domestic attitudes toward the use or value of military power? [2]

In the past 30 years, have there been any important, fundamental (e.g., discontinuous, not obviously extrapolatable) changes in the economic capacity or will of the United States to raise and maintain military forces to meet its international commitments and foreign policy objectives?

Do the American people still feel the need for and accept the use of military force for defense and to meet other national objectives? [3]

Does the U.S. have the money and manpower to maintain a ground force that is creditable enough to play a meaningful role in protecting or advancing the national interest? [2]

Do the American people feel a need for military protection against institutional or state-sponsored terrorism?

Does the military currently have U.S. national support in the general population, Congress, and the administration?

Has there been significant progress toward bipartisan consensus for U.S. foreign policy?

1990 Has national security dropped substantially in importance relative to environmental protection, education or other domestic imperatives?

Has the Army been associated with (or blamed for) any major political or military disaster for the United States during the last 30 years?

Has the importance of national defense relative to other political agenda items increased or decreased?

Defense Budget

- 1990** Is the U.S. military budget more than 4 percent of GNP? [3]
- Is the defense budget greater than 200 billion in 1990 dollars?
- Does the Army receive less than one fourth of the defense budget?

Importation of Raw Materials

- 1987** Is our importation of raw materials greater than 70 percent?
- 1990** Has the U.S. become so dependent on foreign sources of natural resources that we could be severely threatened by a curtailment of these resources (such as the oil embargo of 1972)? [3]
- Does the U.S. rely on imported oil or other hydrocarbons for more than 20 percent of its energy needs?

Environmental

- 1990** Are there any severe threats to the global environment that could lead to U.S. intervention for protection of the environment? [2]
- Has the world environmental situation significantly worsened?

Policeman

- 1990** Is the U.S. still playing or pretending to the role of world policeman or world police chief?
- Is the U.S. still maintaining the role of world policeman, either unilaterally or predominantly? [3]

Other

1987 In the past 30 years, have there been any important, fundamental (e.g., discontinuous, not obviously extrapolatable) changes in the domestic structures of power, ideology and wealth?

In the past 30 years, have there been any important, fundamental (e.g., discontinuous, not obviously extrapolatable) changes in the foreign policy objectives or interests of the United States?

1990 Is the U.S. foreign assistance budget greater than 0.5% of GNP?

Is drug smuggling still a major issue and of national interest?

Is the U.S. still committed to a strategy that is based upon coalition warfare and collective security?

Technology

1987 In 1988, the average range from which a soldier would be fired upon in battle and become a casualty was at or about 3 km. Have the lethality of modern weapons and methods of warfare changed the average range to more than 30 km?

Has the U.S. deployed a working space-based Strategic Defense System?

Has technology significantly changed the nature of conventional warfare (e.g., reliance on unmanned ground combat equipment for SDI)? [3]

In the past 30 years, have there been any important, fundamental (e.g., discontinuous, not obviously extrapolatable) changes in the technical or conceptual means available for the conduct of warfare?

Have there been substantial technology breakthroughs in firepower, mobility and C³I? [2]

Has the role of land combatants been obsolesced by technological advances in weapons?

Has technology significantly changed the nature of conventional warfare?

Have remotely-piloted aircraft changed air warfare?

Have we been able to develop the ability to use the oceans as territory, bases on the ocean floor, etc.?

Has space been exploited any further by colonization/exploration, has there been developed a separate U.S. "Space Force," and has the technology for this force?

Have there been any technological advances that changed the nature of warfare such as:

- a. tanks that produce their own "munitions"
- b. hand-held effective armored vehicle killers
- c. automatic robotic people killers, etc.?

Is it true that technology has reached the stage that if you are seen on the battlefield, you are dead, and it is highly likely that you will be seen?

Has the role of land combatants been made obsolete by technological advances in weapons?

Have specific weapons advances or treaties made nuclear, chemical or biological weapons obsolete or highly unlikely?

1990 Has the nature of warfare been changed by some revolutionary technological advance, i.e., space weapons or laser guns? [2]

Has technology provided a mechanism for engaging in conflict without the use of what was called in 1990 close in battle forces? [2]

Does the U.S. possess technical capabilities that could be utilized in its land forces and that could give it significant advantages over its opponents?

Has cislunar space been exploited for commercial and/or military purposes?

What are the technological baselines in modern weapon systems?

Has the Army become increasingly high-tech in its weapons systems?

Have there been substantial breakthroughs in weapons, propulsion and transportation technologies? [2]

Are projectile weapons still the predominant force on the battlefield?

Have robotic and semi-automated military equipment (included distributed weapons platforms and non-line-of-sight weapons) been fully exploited and integrated into the U.S. military?

Are there any major new offensive military weapons systems in today's [2020] world that were developed since 1990 as a result of major technological advances?